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T.F. Beal

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U.S. Nautical Almanac 11

**THE
AMERICAN EPHEMERIS
AND
NAUTICAL ALMANAC**

✓
FOR THE YEAR

1918



**PUBLISHED BY THE NAUTICAL ALMANAC OFFICE, U. S.
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Captain J. A. HOOGWERFF, *U. S. N.*, *Superintendent.*

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Prof. W. S. EICHELBERGER, *U. S. N.*, *Director.*

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<i>Henry B. Evans.</i>	<i>Louis Lindsey.</i>

Isabel M. Lewis.

—Those whose names are printed in italics devote only a small portion of their time to work of the Nautical Office.

August, 1915.

PREFACE.

This volume of the *American Ephemeris and Nautical Almanac* was prepared under the immediate supervision of Professor W. S. EICHELBERGER, U. S. N., the Director. The character of the matter herein contained and its arrangement are the same as in the two preceding volumes.

This is the third volume to be issued under the international agreement resulting from the *Congrès International des Éphémérides Astronomiques* held at Paris in October, 1911.

The naval appropriation bill approved August 22, 1912, contained the following:

The Secretary of the Navy is hereby authorized to arrange for the exchange of data with such foreign almanac offices as he may from time to time deem desirable, with a view to reducing the amount of duplication of work in preparing the different national nautical and astronomical almanacs and increasing the total data which may be of use to navigators and astronomers available for publication in the *American Ephemeris and Nautical Almanac*: *Provided*, That any such arrangement shall be terminable on one year's notice: *Provided further*, That the work of the Nautical Almanac Office during the continuance of any such arrangement shall be conducted so that in case of emergency the entire portion of the work intended for the use of navigators may be computed by the force employed by that office, and without any foreign cooperation whatsoever: *Provided further*, That any employee of the Nautical Almanac Office who may be authorized in any annual appropriation bill and whose services in whole or in part can be spared from the duty of preparing for publication the annual volumes of the *American Ephemeris and Nautical Almanac* may be employed by said office in the duty of improving the tables of the planets, moon, and stars, to be used in preparing for publication the annual volumes of the office: *Provided further*, That section four hundred and thirty-five, Revised Statutes, is hereby repealed.

The Greenwich ephemerides of the Sun, Moon, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune were furnished by the office of the *British Nautical Almanac*.

The Greenwich ephemeris of Mercury, the elements of Saturn's rings, the elongations of Saturn's satellites, and the apparent places for Greenwich transit of 518 ten-day stars were furnished by the office of the *Berliner Jahrbuch*.

The conjunctions, phenomena, and configurations of Jupiter's satellites I-IV and the apparent places for Greenwich transit of 38

circumpolar stars were furnished by the office of the *Connaissance des Temps*.

The apparent places for Greenwich transit of 121 ten-day stars were furnished by the office of the *Almanaque Nautico*.

The apparent places for Greenwich transit of 137 ten-day stars were furnished by the office of the *Annuario Astronomico di Torino*.

In accordance with the recommendations of the *Congrès International des Éphémérides Astronomiques*, most of the material furnished from abroad is based upon tables prepared in the American Nautical Almanac Office. In the Introduction are mentioned the various tables upon which the different ephemerides are based.

The following computations were made by the American Nautical Almanac Office:

In Part I, all the hourly and daily variations for the quantities furnished from abroad except in the case of the right ascension and declination of the Moon.

In Part II, the quantities used in computing the apparent places of the stars from their mean places; the mean place list; the interpolation of the apparent places of 814 stars from transit at Greenwich to transit at Washington; the apparent places of 11 stars; the interpolation of the ephemerides of the Sun, Moon, and planets from Greenwich noon to transit at Washington; the stellar magnitudes of the planets.

In Part III, the data relating to the eclipses of the Sun and Moon; the data relating to the occultations of stars and planets by the Moon; the ephemerides for physical observations of the Sun, Moon, Mars, and Jupiter; the elements of the illuminated disks of Mercury and Venus; the stellar magnitudes of the planets; the data concerning the satellites of Mars, Uranus, Neptune, the fifth, sixth, and seventh satellites of Jupiter, and the ninth satellite of Saturn; the diagrams of all the satellite orbits; the position angle and distance tables of the satellites of Saturn; the list of phenomena; the list of observatories with their geographical coordinates; and the tables for the determination of latitude and azimuth from observations of Polaris.

All computations made in the American Nautical Almanac Office and those received from the other offices were subjected to checks to insure absence of errors.

J A. HOOGEWERFF,
Captain, U. S. Navy,
Superintendent Naval Observatory.

U. S. NAVAL OBSERVATORY, August, 1915.

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ERRATA.

The American Ephemeris, 1916.

- 2 η Cancr. Spectrum for B5p read K0
For other errata, 1916. see page viii of *The American Ephemeris, 1917.*

The American Ephemeris, 1917.

- 1 Formula for B , coefficient of $\cos 2 L$ for -0.552 read -0.551
2 η Cancr. Spectrum for B5p read K0

INTRODUCTION.

The ephemeris of the Sun is constructed from NEWCOMB'S *Tables of the Sun, Astronomical Papers of the American Ephemeris*, Vol. VI, part 1.

The adopted value of the mean equatorial horizontal parallax of the Sun is 8''.80, *Paris Conference, May, 1896*.

The Sun's rectangular equatorial coördinates are computed from the longitudes and latitudes by the following formulæ:

$$\begin{aligned} X &= R \cos \lambda \\ Y &= R \sin \lambda \cos \omega - 19.3 R \beta \\ Z &= R \sin \lambda \sin \omega + 44.5 R \beta \end{aligned}$$

The reductions to mean equinox are computed by the formulæ—

$$\begin{aligned} \Delta X &= + Y \sec \omega \Delta \lambda \sin 1'' \\ \Delta Y &= -X \cos \omega \Delta \lambda \sin 1'' + Z \Delta \omega \sin 1'' + 9.1 r R \sin (\lambda + 6^\circ) \\ \Delta Z &= -X \sin \omega \Delta \lambda \sin 1'' - Y \Delta \omega \sin 1'' - 21.0 r R \sin (\lambda + 6^\circ) \end{aligned}$$

where the numerical coefficients are in units of the seventh place of decimals and

- R —the Sun's distance from the Earth.
- λ —the Sun's true longitude,
- β —the Sun's true latitude, expressed in seconds of arc,
- ω —the obliquity of the ecliptic,
- $\Delta \lambda$ —the reduction of longitude for precession and nutation from the beginning of the Besselian fictitious year,
- $\Delta \omega$ —the reduction of the mean to the apparent obliquity,
- r —the fraction of the year since the beginning of the Besselian fictitious year.

The longitude, latitude, and parallax of the Moon are derived from HANSEN'S *Tables de la Lune* (London, 1857), the mean longitude being corrected as in previous years, beginning with the volume for the year 1883. The statement concerning these corrections which is contained in the volumes from 1883 to 1911, inclusive, is erroneous, in that they have not been computed strictly in accordance with the formula in NEWCOMB'S *Researches on the Motion of the Moon*, part 1, page 268, *Washington Observations*, 1875, Appendix II. That formula is,

$$-1''.14 - 29''.17 T - 3''.86 T^2 - V_2 - 0''.09 \sin A - 15''.49 \cos A,$$

while the expression actually used is,

$$-1''.14 - 29''.17 T - 3''.76 T^2 - V_2 - 15''.49 \cos A.$$

In these formulæ T is the time in units of 100 years reckoned from 1800.

The ephemerides of Mercury, Venus, and Mars are derived from NEWCOMB'S tables of these planets, *Astronomical Papers of the American Ephemeris*, Vol. VI, parts 2, 3, and 4.

The ephemerides of Jupiter and Saturn are derived from the tables constructed in this office by GEORGE W. HILL, *Astronomical Papers of the American Ephemeris*, Vol. VII, parts 1 and 2.

The ephemerides of Uranus and Neptune are derived from NEWCOMB'S tables of these planets, *Astronomical Papers of the American Ephemeris*, Vol. VII, parts 3 and 4.

The nutation used in computing the ephemerides of the Sun, Moon, and planets has been taken from Tables XXXII and XXXIII of NEWCOMB'S *Tables of the Sun*, *Astronomical Papers of the American Ephemeris*, Vol. VI, part 1. The formulæ from which this nutation is computed are as follows, the time interval T being expressed in units of 100 years, reckoned from 1900. See *Tables of the Sun*, page 26.

$$\begin{array}{ll}
 \delta\psi = -(17''.234 + 0''.017 T) \sin \Omega & \delta s = +9''.214 \cos \Omega \\
 + 0''.209 \sin 2 \Omega & - 0''.090 \cos 2 \Omega \\
 - 1''.257 \sin 2 L & + 0''.546 \cos 2 L \\
 - 0''.049 \sin (3 L + 78^\circ.7) & + 0''.021 \cos (3 L + 78^\circ.7) \\
 + 0''.110 \sin (L + 75^\circ.3) & - 0''.009 \cos (L - 78^\circ.7)
 \end{array}$$

The formulæ for the nutation used in computing the Besselian and Independent Star Numbers are as follows:

Terms of Long Period.	Terms of Short Period.
$\delta\psi = -(17''.234 + 0''.017 T) \sin \Omega$	$-0''.204 \sin 2 \zeta$
$+ 0''.209 \sin 2 \Omega$	$+ 0''.011 \sin (\zeta + \Gamma')$
$- 1''.272 \sin 2 L$	$+ 0''.068 \sin (\zeta - \Gamma')$
$+ 0''.126 \sin (L - \Gamma)$	$- 0''.034 \sin (2 \zeta - \Omega)$
$- 0''.050 \sin (3 L - \Gamma)$	$- 0''.026 \sin (3 \zeta - \Gamma')$
$+ 0''.021 \sin (L + \Gamma)$	$+ 0''.015 \sin (\zeta - 2 L + \Gamma')$
$+ 0''.012 \sin (2 L - \Omega)$	$+ 0''.006 \sin 2 (\zeta - L)$
$\delta s = + (9''.210 + 0''.0009 T) \cos \Omega$	$+ 0''.088 \cos 2 \zeta$
$- 0''.090 \cos 2 \Omega$	$+ 0''.018 \cos (2 \zeta - \Omega)$
$+ 0''.551 \cos 2 L$	$+ 0''.011 \cos (3 \zeta - \Gamma')$
$+ 0''.022 \cos (3 L - \Gamma)$	$- 0''.005 \cos (\zeta + \Gamma')$
$- 0''.009 \cos (L + \Gamma)$	
$- 0''.007 \cos (2 L - \Omega)$	

The meaning of the symbols used and the manner in which these latter formulæ have been employed in computing the ephemerides of the stars are explained on pages 200 and 201. The slight discrepancy between the terms in $2 L$ in these two sets of formulæ is due to the correction of an error in the first set. See *Bulletin Astronomique*, 1898, Vol. XV, page 244.

The list of 825 stars contained in Part II has been selected from NEWCOMB'S *Catalogue of Fundamental Stars*, *Astronomical Papers of the American Ephemeris*, Vol. VIII, part 2.

In general, the names of the stars are the same as in NEWCOMB'S Suggested List of Fundamental Stars, except that the FLAMSTEED number has been omitted in all cases where Greek or italic letters are available. In some cases the constellation and number of the uranometries of HEIS or GOULD have been used. In all such cases, H¹ or the letter G precedes the constellation name, as, for example, 5 H¹. Cassiopeiæ and 38 G. Horologii.

The magnitudes of the stars have, with a few exceptions, been taken from *Annals of the Harvard College Observatory*, Vol. L, 1908.

The spectral classification has been furnished by the Harvard College Observatory. The notation is that of *Annals of Harvard College Observatory*, Vol. LVI.

The mean places, annual variations, and annual proper motions of the stars have been taken from NEWCOMB'S Catalogue, except that those of ϵ Hydri, 38 G. Horologii, and π Centauri have been taken from *Veroeffentlichungen des Koeniglichen Astronomischen Rechen-Instituts zu Berlin*, 1907, No. 33.

The values of $\Delta\alpha$ and $\Delta\delta$ which are given for the companions to the stars γ Andromedæ, α^1 Crucis, ζ^1 Ursæ Majoris and 61 Cygni, have been taken from BOSS'S *Preliminary General Catalogue*, and those for α^2 Geminorum from DOBERCK'S elements given in the *Astronomische Nachrichten*, 1904, vol. 166, page 145.

The formulæ for the computation of the Besselian and Independent Star Numbers are given on page 200, the coefficients being those given by NEWCOMB in *Bulletin Astronomique*, 1898, Vol. XV, page 241.

The terms of short period of the nutation, depending on the Moon's mean longitude, have been computed from the formulæ for these terms given above.

The method by which the right ascensions and declinations of the stars interpolated from the 10-day ephemerides are corrected for the effect of these short-period terms is given on page 201.

According to the formulæ on pages 200 and 201 the star constants $a, b, c, d, a', b', c', d'$ are computed for each star from its mean place at the beginning of the year, but if strict accuracy is required they should be computed from the star's mean place at date, and the following second-order terms should be added to the usual expressions for the reduction from mean to apparent place, namely—

To $\alpha - \alpha_0$	To $\delta - \delta_0$
$\begin{aligned} &+0.000\ 003\ r^2 \sin \alpha \left. \vphantom{\begin{matrix} +0.000\ 003 \\ -0.000\ 149 \end{matrix}} \right\} \tan \delta \\ &-0.000\ 149\ r^2 \cos \alpha \left. \vphantom{\begin{matrix} +0.000\ 003 \\ -0.000\ 149 \end{matrix}} \right\} \tan \delta \\ &-0.000\ 0650\ r^2 \sin 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 0103 \\ -0.000\ 0107 \end{matrix}} \right\} \tan^2 \delta \\ &+0.000\ 0103\ \sin 2\ \odot \cos 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 0103 \\ -0.000\ 0107 \end{matrix}} \right\} \tan^2 \delta \\ &-0.000\ 0107\ \cos 2\ \odot \sin 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 0103 \\ -0.000\ 0107 \end{matrix}} \right\} \tan^2 \delta \\ &+0.000\ 0620\ \sin 2\ \odot \cos 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 0620 \\ -0.000\ 0622 \end{matrix}} \right\} \sec^2 \delta \\ &-0.000\ 0622\ \cos 2\ \odot \sin 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 0620 \\ -0.000\ 0622 \end{matrix}} \right\} \sec^2 \delta \\ &+0.000\ 0513\ \sin (\odot + \odot) \cos 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 0513 \\ -0.000\ 0507 \end{matrix}} \right\} \tan \delta \sec \delta \\ &-0.000\ 0507\ \cos (\odot + \odot) \sin 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 0513 \\ -0.000\ 0507 \end{matrix}} \right\} \tan \delta \sec \delta \\ &+0.000\ 0097\ \sin (\odot - \odot) \cos 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 0097 \\ -0.000\ 0053 \end{matrix}} \right\} \tan \delta \sec \delta \\ &-0.000\ 0053\ \cos (\odot - \odot) \sin 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 0097 \\ -0.000\ 0053 \end{matrix}} \right\} \tan \delta \sec \delta \end{aligned}$	$\begin{aligned} &+0.000\ 975\ r^2 \sin^2 \alpha \left. \vphantom{\begin{matrix} +0.000\ 975 \\ -0.000\ 023 \end{matrix}} \right\} \tan \delta \\ &-0.000\ 023\ \cos 2\ \odot \left. \vphantom{\begin{matrix} +0.000\ 975 \\ -0.000\ 023 \end{matrix}} \right\} \tan \delta \\ &-0.000\ 080\ \cos 2\ \odot \cos 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 080 \\ -0.000\ 077 \end{matrix}} \right\} \tan \delta \\ &-0.000\ 077\ \sin 2\ \odot \sin 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 080 \\ -0.000\ 077 \end{matrix}} \right\} \tan \delta \\ &+0.000\ 040\ \cos 2\ \odot \left. \vphantom{\begin{matrix} +0.000\ 040 \\ -0.000\ 467 \end{matrix}} \right\} \tan \delta \\ &-0.000\ 467\ \cos 2\ \odot \cos 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 040 \\ -0.000\ 467 \end{matrix}} \right\} \tan \delta \\ &-0.000\ 465\ \sin 2\ \odot \sin 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 040 \\ -0.000\ 467 \end{matrix}} \right\} \tan \delta \\ &-0.000\ 039\ \cos (\odot + \odot) \left. \vphantom{\begin{matrix} +0.000\ 039 \\ -0.000\ 380 \end{matrix}} \right\} \sin \delta \tan \delta \\ &-0.000\ 380\ \cos (\odot + \odot) \cos 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 039 \\ -0.000\ 380 \end{matrix}} \right\} \sin \delta \tan \delta \\ &-0.000\ 385\ \sin (\odot + \odot) \sin 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 039 \\ -0.000\ 380 \end{matrix}} \right\} \sin \delta \tan \delta \\ &-0.000\ 380\ \cos (\odot - \odot) \left. \vphantom{\begin{matrix} +0.000\ 039 \\ -0.000\ 380 \end{matrix}} \right\} \sin \delta \tan \delta \\ &-0.000\ 040\ \cos (\odot - \odot) \cos 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 039 \\ -0.000\ 380 \end{matrix}} \right\} \sin \delta \tan \delta \\ &-0.000\ 072\ \sin (\odot - \odot) \sin 2\alpha \left. \vphantom{\begin{matrix} +0.000\ 039 \\ -0.000\ 380 \end{matrix}} \right\} \sin \delta \tan \delta \end{aligned}$

These terms are negligible for stars whose declination is numerically less than 80° , but in computing the apparent places given in the American Ephemeris they have been applied whenever sensible.

The *apparent* places of seven stars have been corrected for the effect of annual parallax. These stars, with the adopted values of the annual parallax, are—

r Ceti	0.31	"	α Centauri	0.75
ϵ Eridani	0.32	"	α Aquilæ (Altair) . . .	0.23
α Canis Majoris (Sirius) . .	0.38	"	61 Cygni	0.30
α Canis Minoris (Procyon) .	0.33			

The *apparent* places of α Canis Majoris (Sirius), α Canis Minoris (Procyon), and α^2 Centauri have been corrected for the effect of orbital motion. AUWERS's elements were used for Sirius and Procyon, and SEE's elements for α^2 Centauri. The values of these corrections are given on pages 98 and 99 of *Veroeffentlichungen des Koeniglichen Astronomischen Rechen-Instituts zu Berlin*, 1907, No. 33, but those for Sirius and Procyon need an additional correction to refer them to the center of the orbit before they are applicable to the mean places taken from NEWCOMB's Fundamental Catalogue. These additional corrections for Sirius and Procyon were omitted in the *Star List of the American Ephemeris* [Supplement to the *American Ephemeris and Nautical Almanac*] for 1910 and 1911, and in the *American Ephemeris and Nautical Almanac* for 1912 and 1913. The values of the corrections for the three stars are—

	Sirius.		Procyon.		α^2 Centauri.	
	1918.0	1919.0	1918.0	1919.0	1918.0	1919.0
$\Delta\alpha$	-0°.143	-0°.143	-0°.061	-0°.057	+0°.634	+0°.620
$\Delta\delta$	-0''.72	-0''.84	+0''.18	+0''.31	+5''.70	+5''.41

These corrections have not been applied to the mean places as published in this volume.

The stars occulted by the Moon have been selected from the *Catalogue of Zodiacal Stars* contained in Vol. VIII, part 3, *Astronomical Papers of the American Ephemeris*, and the mean places have been derived from the same catalogue.

In Part III the elements of eclipses of the Sun and occultations of stars by the Moon are given in accordance with BESSEL's method, the special forms employed being a modification of those developed in CHAUVENET's *Spherical and Practical Astronomy*.

In the computation of the elements of eclipses, the following corrections to the longitude, latitude, and parallax of the Moon, deduced by NEWCOMB from recent observations of occultations of stars by the Moon, *Astronomical Papers of the American Ephemeris*, Vol. IX, part 1, have been applied. These corrections have been assumed in each case to be constant during the eclipse.

G. M. T.	δv	δb	$\delta \pi$
1918	"	"	"
June 8 ^d 10 ^h	+6.2	+1.2	+0.47
June 23 23	+6.7	-0.1	+0.45
Dec. 3 3	+6.2	-0.3	+0.42

The elongations of the satellites of Mars are derived from elements given by H. STRUVE in *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften*, 1911, page 1073.

The conjunctions and phenomena of Jupiter's four brighter satellites are derived from SAMPSON's tables. The configurations are derived from a continuation of DAMOISEAU's tables by M. POTTIER.

The elongations of the Vth satellite of Jupiter are derived from unpublished elements deduced from the observations of BARNARD.

The differential coordinates of Jupiter's VIth and VIIth satellites are derived from elements and tables given in *Lick Observatory Bulletin*, 1906, Vol. IV, No. 112, and in *Astronomische Nachrichten*, 1907, Vol. 174, page 359, respectively.

The positions of the rings and the elongations and conjunctions of the satellites of Saturn are derived from elements given by H. STRUVE in *Observations de Poulkova*, Supplement 1, St. Petersburg, 1888; *Publications de Poulkovo*, Second Series, Vol. XI, St. Petersburg, 1898; with corrections communicated by H. STRUVE to the *Berliner Jahrbuch*. The differential coordinates of Phœbe are derived from elements and tables given in *Annals of Harvard College Observatory*, 1905, Vol. LIII, No. VI.

The apparent outer dimensions (a and b) of the rings of Saturn are also according to STRUVE; the relative dimensions of the rings are computed from BESSEL'S data, except those for the dusky ring, which are based on the observations of various astronomers.

The elongations of Ariel and Umbriel, the inner satellites of Uranus, are derived from the data of NEWCOMB'S *Uranian and Neptunian Systems*, Washington Observations, 1873, Appendix I. The elongations of Titania and Oberon, the outer satellites of Uranus, are derived from elements given by H. STRUVE in *Abhandlungen der K. Preussischen Akademie der Wissenschaften*, 1912.

The elongations of the satellite of Neptune are derived from elements given by A. HALL in the *Astronomical Journal*, 1898, Vol. XIX, page 65.

The adopted apparent semidiameter of the Sun at the Earth's mean distance is $16' 1''.50$, while in the computation of eclipses the value given by AUWERS in the *Astronomische Nachrichten*, 1891, Vol. 128, page 367, is employed, viz., $15' 59''.63$.

In the computation of the ephemeris for physical observations of the Sun the following elements by CARRINGTON have been used:

Inclination of the Sun's equator to the ecliptic	$7^{\circ} 15'$
Longitude of the ascending node of the Sun's equator on the ecliptic	$73^{\circ} 40' + 50''.25 (t-1850)$
Sidereal period of rotation (mean solar days)	$25^d.38$

The apparent semidiameter of the Moon is computed from the Moon's equatorial horizontal parallax, π , by the formula,

$$S = 0.272\,506\,\pi + 1''.50$$

where the constant 0.272 506 is based on data from occultations given by J. PETERS in the *Astronomische Nachrichten*, 1895, Vol. 138, page 147; and the constant $1''.50$ is added to cover the average effect of irradiation.

The value of the Moon's semidiameter employed in the computation of eclipses is computed from the formula,

$$\sin S = 0.272\,274 \sin \pi$$

In the computation of the ephemeris for physical observations of the Moon, the following notation and formulæ have been used, the value of I and the formulæ for physical libration being those given by F. HAYN in *Abhandlungen der K. Sächsischen Gesell. der Wissenschaften*, Vols. 29 and 30, 1904, 1907:

I —the inclination of the Moon's mean equator to the ecliptic ($-1^{\circ} 32'.1$),

Ω —the longitude of the ascending node of the Moon's orbit, or the longitude of the descending node of the Moon's mean equator,

C —the angle at the center of the Moon's disk made by a lunar meridian with the circle of declination, counted from north to east,

$\lambda, \beta, \alpha, \delta$ —the geocentric longitude, latitude, right ascension, and declination of the Moon

i —the inclination of the Moon's mean equator to the Earth's true equator,
 Δ —the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic,
 Ω' —the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator,
 ζ —the Moon's mean longitude, referred to the mean equinox,
 g' —the Earth's mean anomaly,
 g —the Moon's mean anomaly,
 ω —the angular distance of the perigee of the Moon's orbit from its ascending node on the ecliptic,
 b, l —the optical librations in latitude and longitude, respectively,
 $\delta b, \delta l$ —the physical librations in latitude and longitude, respectively,
 $b + \delta b$ —the Moon's geocentric libration in latitude—the Earth's selenographic latitude,
 $l + \delta l$ —the Moon's geocentric libration in longitude—the Earth's selenographic longitude,
 δC —the physical libration of C ,
 $\mu = -0'.617 \sin 2(\Omega - \lambda)$,
 $A = \sin I \cos(\Omega - \lambda)$,
 $\tan B = \tan I \sin(\Omega - \lambda)$,
 $\lambda' = \lambda + \mu + Ab$,
 $b = B - \beta$,
 $l = \lambda' - \zeta$,
 $\sin C' = \sin i \frac{\cos(\lambda' + \Delta - \Omega)}{\cos \delta} = -\sin i \frac{\cos(\alpha - \Omega')}{\cos b}$,
 $\delta b = +108'' \sin(\omega + l) + 37'' \sin(\omega - l) - 11'' \sin(g + \omega - l)$,
 $\delta l = +12'' \sin g - 59'' \sin g' - 18'' \sin 2\omega$,
 $-[108'' \cos(\omega + l) - 37'' \cos(\omega - l) + 11'' \cos(g + \omega - l)] \tan b$,
 $\delta C = -[108'' \cos(\omega + l) - 37'' \cos(\omega - l) + 11'' \cos(g + \omega - l)] \sec b$,
 $C = C' + \delta C$.

The Sun's selenographic latitude and longitude have been computed from formulæ the same as those given above except that the heliocentric coordinates of the Moon have been substituted for the geocentric coordinates.

The following elements have been used in computing the ephemerides for physical observations of the planets Mars and Jupiter:

Position of north pole of Mars	. . . . .	$\begin{cases} \alpha = 21^h 10^m 0^s + 1^s.565(t-1905) \\ \delta = 54^\circ 30' 0'' + 12''.60(t-1905) \end{cases}$
Position of north pole of Jupiter	. . . . .	$\begin{cases} \alpha = 17^h 52^m 0^s.84 + 0^s.247(t-1910) \\ \delta = 64^\circ 33' 34''.6 - 0''.60(t-1910) \end{cases}$
Rotation period of Mars	. . . . .	$24^h 37^m 22^s.65$
Rotation period of Jupiter	{ System I.	$9^h 50^m 30^s.004$
	{ System II.	$9^h 55^m 40^s.632$
Longitude of Central Meridian of Mars, May 15, 1897, Greenwich		
Mean Noon	. . . . .	$52^\circ.01$
Longitude of Central Meridian of Jupiter (System I.), July 14, 1897, Greenwich Mean Noon		
	. . . . .	$47^\circ.31$
Longitude of Central Meridian of Jupiter (System II.), July 14, 1897, Greenwich Mean Noon		
	. . . . .	$96^\circ.58$

The position of the north pole of Mars is as given by LOWELL and CROMMELIN (see *Monthly Notices R. A. S.*, 1905, Vol. 66, page 56), while that of the north pole of Jupiter has been deduced from the position given by DAMOISEAU for 1750 (see *Tables Écliptiques des Satellites de Jupiter*, page (1)). The rotation periods of Mars and of Jupiter and the longitudes of the central meridians are according to MARTIN (see *Monthly Notices R. A. S.*, 1896, Vol. 56, pages 395–403 and 517–524). The longitude of the Great Red Spot and the time of its transit across the Central Meridian given in the volumes for 1913 and 1914

have been replaced by those of System II. of MARTH. This change has been made in view of the following facts: The Paris Conference of October, 1911, assigned to the office of the American Ephemeris and Nautical Almanac the preparation of the ephemerides for the physical observations of the planets; a general desire exists that the use of System II. of MARTH should not be discontinued; and the position of the Great Red Spot during the opposition of 1912 was about 70° from the place predicted from the elements adopted in the *American Ephemeris and Nautical Almanac* for 1913.

The adopted semidiameters of the planets, with the authority for each, are given on page xvii. Their stellar magnitudes have been computed from formulæ given by G. MUELLER in *Publicationen des Astrophysikalischen Observatoriums zu Potsdam*, 1893, Vol. 8, page 366.

In the list of observatories the authority for the various positions is given in each case. The latitudes given are in most cases astronomical. In some instances they have been determined by geodetic triangulation from other points. The reductions from geographic to geocentric latitude, $\varphi' - \varphi$, and the distance from the center of the earth, ρ , are computed from the formulæ on page xvi, using the flattening $\frac{1}{297}$ obtained by JOHN F. HAYFORD in *Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy*, U. S. Coast and Geodetic Survey, 1910, and adopted by the *Paris Conference*, October, 1911.

ANNIVERSARIES AND FESTIVALS, 1918.

New Year's Day	Tuesday,	Jan. 1.
Epiphany	Sunday,	Jan. 6.
Septuagesima Sunday	Sunday,	Jan. 27.
Quinquagesima (Shrove Sunday)	Sunday,	Feb. 10.
Lincoln's Birthday	Tuesday,	Feb. 12.
Ash Wednesday	Wednesday,	Feb. 13.
Washington's Birthday	Friday,	Feb. 22.
Palm Sunday	Sunday,	Mar. 24.
First Day of Passover	Thursday,	Mar. 28.
Good Friday	Friday,	Mar. 29.
Easter Sunday	Sunday,	Mar. 31.
Rogation Sunday	Sunday,	May 5.
Ascension Day (Holy Thursday)	Thursday,	May 9.
Hebrew Pentecost (Shebuoth)	Friday,	May 17.
Pentecost (Whit Sunday)	Sunday,	May 19.
Trinity Sunday	Sunday,	May 26.
Memorial Day	Thursday,	May 30.
Corpus Christi	Thursday,	May 30.
Independence Day	Thursday,	July 4.
Labor Day	Monday,	Sept. 2.
Hebrew New Year (Rosh Hashanah)	Saturday,	Sept. 7.
Day of Atonement (Yom Kippur)	Monday,	Sept. 16.
First Day of Tabernacle (Sucoth)	Saturday,	Sept. 21.
Columbus Day	Saturday,	Oct. 12.
General Election Day (except in certain States)	Tuesday,	Nov. 5.
Thanksgiving Day	Thursday,	Nov. 28.
First Sunday in Advent	Sunday,	Dec. 1.
Christmas Day	Wednesday,	Dec. 25.

CHRONOLOGICAL ERAS AND CYCLES.

CHRONOLOGICAL ERAS.

The year 1918 of the Christian era comprises the latter part of the 142d and the beginning of the 143d year of the independence of the United States of America, and corresponds to the year 6631 of the Julian period.

Of the peoples using the Christian era some employ the Gregorian calendar and some the Julian. January 1, 1918, Julian calendar, corresponds to January 14, 1918, Gregorian calendar.

The year 7427 of the Byzantine era begins on September 1, 1918, Julian calendar.

The year 5679 of the Jewish era begins at sunset on September 6, 1918, Gregorian calendar.

The year 2671 since the foundation of Rome, according to VARRO, begins on January 1, 1918, Julian calendar.

The year 2667 of the era of NABONASSAR begins on May 1, 1918, Julian calendar.

The year 2578 of the Japanese era, being the 7th year of the period Taisho, begins on January 1, 1918, Gregorian calendar.

The year 2230 of the Grecian era, or the era of the SELEUCIDÆ, begins in the present day usage of the Syrians on September 1, 1918, or on October 1, 1918, Julian calendar, according to different sects; but in the ancient usage of Damascus and Arabia Petræa the year began with the vernal equinox.

The year 1635 of the era of DIOCLETIAN begins on August 29, 1918, Julian calendar.

The year 1337 of the Mohammedan era, or the era of the Hegira, begins at sunset on October 6, 1918, Gregorian calendar.

2 421 595 is the Julian day number of January 1, 1918, Gregorian calendar.

CHRONOLOGICAL CYCLES.

Dominical Letter	F	Solar Cycle	23
Epact	17	Roman Indiction	1
Lunar Cycle or Golden Number	19	Julian Period	6631

SYMBOLS AND ABBREVIATIONS.

SIGNS OF THE PLANETS, ETC.

☉	The Sun.	♂	Mars.
☾	The Moon.	♃	Jupiter.
☿	Mercury.	♄	Saturn.
♀	Venus.	♅	Uranus.
♁	The Earth.	♆	Neptune.

SIGNS OF THE ZODIAC.

Spring signs.	{	1.	♈	Aries.	Autumn Signs.	{	7.	♎	Libra.
		2.	♉	Taurus.			8.	♏	Scorpius.
		3.	♊	Gemini.			9.	♐	Sagittarius.
Summer signs.	{	4.	♋	Cancer.	Winter Signs.	{	10.	♑	Capricornus.
		5.	♌	Leo.			11.	♒	Aquarius.
		6.	♍	Virgo.			12.	♓	Pisces.

ASPECTS.

- ☿ Conjunction, or having the same Longitude or Right Ascension.
- ☐ Quadrature, or differing $\pm 90^\circ$ in Longitude or Right Ascension.
- ♁ Opposition, or differing 180° in Longitude or Right Ascension.

ABBREVIATIONS.

♈	Ascending Node.	°	Degrees.
♏	Descending Node.	'	Minutes of Arc.
N.	North.	"	Seconds of Arc.
S.	South.	h	Hours.
E.	East.	m	Minutes of Time.
W.	West.	s	Seconds of Time.

PART I.

ASTRONOMICAL EPHEMERIS FOR THE
MERIDIAN OF GREENWICH.

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.			
		h	m	s	s	°	'	"	"	'	"	m	s	h	m	s	
Jan. 1	Tu	18	44	44.66	11.042	—23	3	5.4	+11.80	16	17.88	8.95	— 3 26.25	—1.185	18	41	18.41
2	We	18	49	9.52	11.029	22	58	8.4	12.95	16	17.88	8.95	3 54.55	1.172	18	45	14.97
3	Th	18	53	34.06	11.015	22	52	43.9	14.09	16	17.87	8.95	4 22.53	1.159	18	49	11.53
4	Fr	18	57	58.25	11.000	22	46	52.1	15.22	16	17.86	8.95	4 50.16	1.143	18	53	8.09
5	Sa	19	2	22.05	10.983	22	40	33.1	16.35	16	17.84	8.95	5 17.41	1.127	18	57	4.65
6	Su	19	6	45.45	10.966	—22	33	47.1	+17.47	16	17.82	8.95	— 5 44.25	—1.109	19	1	1.20
7	Mo	19	11	8.42	10.947	22	26	34.3	18.59	16	17.79	8.95	6 10.65	1.090	19	4	57.76
8	Tu	19	15	30.91	10.927	22	18	54.9	19.69	16	17.76	8.95	6 36.59	1.071	19	8	54.32
9	We	19	19	52.92	10.906	22	10	49.1	20.79	16	17.72	8.95	7 2.04	1.050	19	12	50.88
10	Th	19	24	14.40	10.884	22	2	17.2	21.87	16	17.68	8.95	7 26.97	1.027	19	16	47.44
11	Fr	19	28	35.34	10.860	—21	53	19.4	+22.94	16	17.63	8.95	— 7 51.35	—1.004	19	20	43.99
12	Sa	19	32	55.70	10.836	21	43	56.0	24.00	16	17.58	8.95	8 15.15	0.979	19	24	40.55
13	Su	19	37	15.46	10.810	21	34	7.3	25.05	16	17.53	8.95	8 38.35	0.954	19	28	37.11
14	Mo	19	41	34.59	10.783	21	23	53.6	26.09	16	17.48	8.95	9 0.92	0.927	19	32	33.67
15	Tu	19	45	53.06	10.755	21	13	15.2	27.11	16	17.42	8.95	9 22.84	0.898	19	36	30.22
16	We	19	50	10.85	10.727	—21	2	12.4	+28.12	16	17.36	8.95	— 9 44.07	—0.870	19	40	26.78
17	Th	19	54	27.94	10.697	20	50	45.5	29.11	16	17.29	8.94	10 4.60	0.840	19	44	23.34
18	Fr	19	58	44.31	10.667	20	38	55.0	30.09	16	17.22	8.94	10 24.41	0.810	19	48	19.90
19	Sa	20	2	59.94	10.636	20	26	41.1	31.06	16	17.14	8.94	10 43.49	0.779	19	52	16.45
20	Su	20	7	14.82	10.604	20	14	4.1	32.01	16	17.06	8.94	11 1.81	0.747	19	56	13.01
21	Mo	20	11	28.93	10.572	—20	1	4.4	+32.95	16	16.98	8.94	—11 19.36	—0.715	20	0	9.57
22	Tu	20	15	42.26	10.539	19	47	42.4	33.87	16	16.89	8.94	11 36.14	0.683	20	4	6.12
23	We	20	19	54.81	10.506	19	33	58.4	34.77	16	16.79	8.94	11 52.13	0.650	20	8	2.68
24	Th	20	24	6.57	10.473	19	19	52.7	35.68	16	16.69	8.94	12 7.33	0.617	20	11	59.24
25	Fr	20	28	17.53	10.440	19	5	25.7	36.56	16	16.58	8.94	12 21.73	0.583	20	15	55.79
26	Sa	20	32	27.68	10.406	—18	50	37.8	+37.43	16	16.47	8.94	—12 35.33	—0.550	20	19	52.35
27	Su	20	36	37.03	10.373	18	35	29.2	38.28	16	16.35	8.94	12 48.13	0.516	20	23	48.91
28	Mo	20	40	45.58	10.339	18	20	0.5	39.11	16	16.22	8.93	13 0.12	0.483	20	27	45.46
29	Tu	20	44	53.32	10.305	18	4	11.9	39.93	16	16.09	8.93	13 11.30	0.449	20	31	42.02
30	We	20	49	0.24	10.272	17	48	3.8	40.74	16	15.95	8.93	13 21.67	0.415	20	35	38.58
31	Th	20	53	6.36	10.238	—17	31	36.6	+41.52	16	15.81	8.93	—13 31.23	—0.381	20	39	35.13
Feb. 1	Fr	20	57	11.67	10.205	17	14	50.8	42.29	16	15.67	8.93	13 39.98	0.348	20	43	31.69
2	Sa	21	1	16.18	10.171	16	57	46.6	43.05	16	15.51	8.93	13 47.93	0.315	20	47	28.24
3	Su	21	5	19.88	10.137	16	40	24.5	43.79	16	15.36	8.93	13 55.08	0.281	20	51	24.80
4	Mo	21	9	22.78	10.104	16	22	44.9	44.51	16	15.20	8.93	14 1.42	0.248	20	55	21.36
5	Tu	21	13	24.88	10.071	—16	4	48.1	+45.21	16	15.02	8.92	—14 6.97	—0.215	20	59	17.91
6	We	21	17	26.19	10.038	15	46	34.7	45.90	16	14.85	8.92	14 11.72	0.181	21	3	14.47
7	Th	21	21	26.70	10.005	15	28	5.0	46.57	16	14.68	8.92	14 15.68	0.149	21	7	11.02
8	Fr	21	25	26.43	9.972	15	9	19.4	47.22	16	14.51	8.92	14 18.85	0.116	21	11	7.58
9	Sa	21	29	25.38	9.940	14	50	18.4	47.85	16	14.33	8.92	14 21.24	0.083	21	15	4.13
10	Su	21	33	23.54	9.907	—14	31	2.4	+48.47	16	14.15	8.92	—14 22.85	—0.051	21	19	0.69
11	Mo	21	37	20.93	9.875	14	11	31.9	49.06	16	13.97	8.91	14 23.68	—0.019	21	22	57.24
12	Tu	21	41	17.54	9.843	13	51	47.3	49.64	16	13.78	8.91	14 23.74	+0.014	21	26	53.80
13	We	21	45	13.38	9.811	13	31	49.0	50.20	16	13.59	8.91	14 23.03	0.046	21	30	50.35
14	Th	21	49	8.46	9.779	13	11	37.6	50.74	16	13.40	8.91	14 21.55	0.077	21	34	46.91
15	Fr	21	53	2.78	9.748	—12	51	13.4	+51.26	16	13.21	8.91	—14 19.32	+0.109	21	38	43.46
16	Sa	21	56	56.35	9.717	—12	30	36.9	+51.77	16	13.02	8.91	—14 16.33	+0.140	21	42	40.02

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" " "	"	"			"	"	"	23° 26'	h m s
Jan. 1	1	280 17 18.8	152.86	-0.69	9.992 6651	- 0.2	0.04	+17.67	20.81	59.55	5 17 49.38
2	2	281 18 27.6	152.87	0.75	9.992 6659	+ 0.9	0.18	17.72	20.81	59.55	5 13 53.46
3	3	282 19 36.7	152.88	0.78	9.992 6692	1.9	0.32	17.76	20.81	59.54	5 9 57.55
4	4	283 20 45.9	152.89	0.78	9.992 6749	2.9	0.46	17.80	20.81	59.54	5 6 1.64
5	5	284 21 55.4	152.90	0.76	9.992 6830	3.9	0.60	17.85	20.81	59.54	5 2 5.73
6	6	285 23 5.0	152.90	-0.71	9.992 6934	+ 4.8	0.73	+17.89	20.81	59.54	4 58 9.82
7	7	286 24 14.7	152.91	0.64	9.992 7060	5.7	0.87	17.93	20.81	59.54	4 54 13.90
8	8	287 25 24.5	152.91	0.54	9.992 7206	6.5	1.01	17.97	20.81	59.54	4 50 17.99
9	9	288 26 34.2	152.91	0.42	9.992 7371	7.2	1.15	18.01	20.81	59.55	4 46 22.08
10	10	289 27 44.0	152.90	0.28	9.992 7554	8.0	1.28	18.05	20.81	59.55	4 42 26.17
11	11	290 28 53.6	152.89	-0.14	9.992 7754	+ 8.7	1.42	+18.09	20.81	59.55	4 38 30.26
12	12	291 30 2.9	152.88	0.00	9.992 7970	9.3	1.56	18.13	20.81	59.55	4 34 34.34
13	13	292 31 12.0	152.87	+0.13	9.992 8202	10.0	1.70	18.16	20.81	59.56	4 30 38.43
14	14	293 32 20.5	152.84	0.25	9.992 8449	10.6	1.83	18.20	20.80	59.56	4 26 42.52
15	15	294 33 28.5	152.82	0.34	9.992 8712	11.3	1.97	18.23	20.80	59.57	4 22 46.61
16	16	295 34 35.8	152.79	+0.41	9.992 8992	+12.0	2.11	+18.27	20.80	59.57	4 18 50.70
17	17	296 35 42.3	152.75	0.45	9.992 9288	12.8	2.25	18.30	20.80	59.58	4 14 54.78
18	18	297 36 48.0	152.72	0.45	9.992 9604	13.6	2.38	18.33	20.80	59.59	4 10 58.87
19	19	298 37 52.7	152.68	0.41	9.992 9939	14.4	2.52	18.36	20.80	59.59	4 7 2.96
20	20	299 38 56.5	152.64	0.35	9.993 0296	15.3	2.66	18.38	20.80	59.60	4 3 7.05
21	21	300 39 59.4	152.60	+0.26	9.993 0675	+16.3	2.80	+18.41	20.79	59.60	3 59 11.14
22	22	301 41 1.3	152.56	0.15	9.993 1078	17.3	2.93	18.43	20.79	59.61	3 55 15.23
23	23	302 42 2.1	152.51	+0.03	9.993 1506	18.4	3.07	18.45	20.79	59.62	3 51 19.32
24	24	303 43 2.0	152.48	-0.10	9.993 1959	19.4	3.21	18.48	20.79	59.63	3 47 23.41
25	25	304 44 1.0	152.44	0.22	9.993 2438	20.5	3.35	18.50	20.79	59.64	3 43 27.50
26	26	305 44 59.0	152.40	-0.34	9.993 2943	+21.6	3.48	+18.51	20.78	59.65	3 39 31.59
27	27	306 45 56.1	152.36	0.45	9.993 3474	22.7	3.62	18.53	20.78	59.66	3 35 35.68
28	28	307 46 52.3	152.32	0.54	9.993 4031	23.7	3.76	18.55	20.78	59.66	3 31 39.77
29	29	308 47 47.6	152.29	0.60	9.993 4613	24.8	3.90	18.56	20.77	59.67	3 27 43.86
30	30	309 48 42.1	152.25	0.64	9.993 5219	25.8	4.03	18.57	20.77	59.68	3 23 47.95
31	31	310 49 35.7	152.21	-0.65	9.993 5850	+26.8	4.17	+18.58	20.77	59.69	3 19 52.04
Feb. 1	32	311 50 28.4	152.18	0.63	9.993 6504	27.7	4.31	18.59	20.77	59.70	3 15 56.13
2	33	312 51 20.3	152.14	0.59	9.993 7180	28.6	4.45	18.60	20.76	59.71	3 12 0.22
3	34	313 52 11.3	152.11	0.53	9.993 7876	29.4	4.58	18.60	20.76	59.72	3 8 4.31
4	35	314 53 1.5	152.07	0.44	9.993 8593	30.3	4.72	18.60	20.76	59.73	3 4 8.40
5	36	315 53 50.8	152.03	-0.33	9.993 9328	+31.0	4.86	+18.61	20.75	59.74	3 0 12.49
6	37	316 54 39.1	151.99	0.20	9.994 0080	31.6	5.00	18.61	20.75	59.75	2 56 16.58
7	38	317 55 26.4	151.95	-0.07	9.994 0847	32.2	5.14	18.60	20.74	59.76	2 52 20.67
8	39	318 56 12.8	151.91	+0.06	9.994 1628	32.8	5.27	18.60	20.74	59.77	2 48 24.76
9	40	319 56 58.0	151.86	0.20	9.994 2422	33.3	5.41	18.60	20.74	59.78	2 44 28.85
10	41	320 57 42.1	151.81	+0.32	9.994 3227	+33.7	5.55	+18.59	20.73	59.79	2 40 32.94
11	42	321 58 24.9	151.75	0.42	9.994 4042	34.2	5.69	18.58	20.73	59.80	2 36 37.03
12	43	322 59 6.3	151.69	0.49	9.994 4868	34.6	5.82	18.57	20.73	59.81	2 32 41.12
13	44	323 59 46.2	151.63	0.53	9.994 5703	35.0	5.96	18.56	20.72	59.82	2 28 45.21
14	45	325 0 24.5	151.56	0.53	9.994 6548	35.4	6.10	18.55	20.72	59.83	2 24 49.30
15	46	326 1 1.1	151.49	+0.50	9.994 7404	+35.9	6.24	+18.54	20.71	59.84	2 20 53.39
16	47	327 1 36.0	151.41	+0.44	9.994 8272	+36.4	6.37	+18.52	20.71	59.85	2 16 57.49

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.		
		h	m	s	s	°	'	"	"	'	"	m	s	h	m	s
Feb. 16	Sa	21	56	56.35	9.717	−12	30	36.9	+51.77	16	13.02	8.91	−14 16.33	+0.140	21	42 40.02
17	Su	22	0	49.18	9.686	12	9	48.5	52.26	16	12.82	8.90	14 12.61	0.170	21	46 36.57
18	Mo	22	4	41.28	9.656	11	48	48.6	52.73	16	12.62	8.90	14 8.16	0.200	21	50 33.12
19	Tu	22	8	32.67	9.627	11	27	37.6	53.18	16	12.42	8.90	14 3.00	0.230	21	54 29.68
20	We	22	12	23.37	9.598	11	6	15.9	53.62	16	12.21	8.90	13 57.14	0.258	21	58 26.23
21	Th	22	16	13.38	9.570	−10	44	44.0	+54.04	16	12.00	8.90	−13 50.60	+0.286	22	2 22.79
22	Fr	22	20	2.73	9.543	10	23	2.1	54.44	16	11.78	8.89	13 43.39	0.314	22	6 19.34
23	Sa	22	23	51.43	9.516	10	1	10.8	54.83	16	11.56	8.89	13 35.54	0.340	22	10 15.89
24	Su	22	27	39.50	9.490	9	39	10.4	55.20	16	11.34	8.89	13 27.06	0.366	22	14 12.45
25	Mo	22	31	26.96	9.465	9	17	1.2	55.56	16	11.11	8.89	13 17.96	0.391	22	18 9.00
26	Tu	22	35	13.84	9.441	−8	54	43.6	+55.90	16	10.88	8.89	−13 8.28	+0.415	22	22 5.55
27	We	22	39	0.14	9.418	8	32	18.1	56.22	16	10.65	8.88	12 58.04	0.438	22	26 2.11
28	Th	22	42	45.90	9.395	8	9	45.1	56.53	16	10.41	8.88	12 47.24	0.461	22	29 58.66
Mar. 1	Fr	22	46	31.12	9.374	7	47	4.8	56.82	16	10.16	8.88	12 35.91	0.483	22	33 55.21
2	Sa	22	50	15.84	9.353	7	24	17.7	57.10	16	9.92	8.88	12 24.07	0.503	22	37 51.77
3	Su	22	54	0.07	9.333	−7	1	24.2	+57.36	16	9.67	8.87	−12 11.75	+0.523	22	41 48.32
4	Mo	22	57	43.83	9.314	6	38	24.6	57.60	16	9.42	8.87	11 58.96	0.542	22	45 44.87
5	Tu	23	1	27.15	9.296	6	15	19.3	57.83	16	9.16	8.87	11 45.72	0.560	22	49 41.43
6	We	23	5	10.04	9.279	5	52	8.8	58.04	16	8.91	8.87	11 32.06	0.578	22	53 37.98
7	Th	23	8	52.52	9.262	5	28	53.3	58.24	16	8.65	8.87	11 17.99	0.594	22	57 34.53
8	Fr	23	12	34.62	9.246	−5	5	33.4	+58.42	16	8.39	8.86	−11 3.53	+0.610	23	1 31.09
9	Sa	23	16	16.34	9.231	4	42	9.4	58.58	16	8.13	8.86	10 48.70	0.625	23	5 27.64
10	Su	23	19	57.72	9.217	4	18	41.6	58.72	16	7.87	8.86	10 33.52	0.639	23	9 24.19
11	Mo	23	23	38.76	9.203	3	55	10.6	58.85	16	7.61	8.86	10 18.01	0.653	23	13 20.74
12	Tu	23	27	19.48	9.190	3	31	36.6	58.97	16	7.34	8.85	10 2.18	0.666	23	17 17.30
13	We	23	30	59.90	9.178	−3	8	0.2	+59.06	16	7.08	8.85	−9 46.05	+0.678	23	21 13.85
14	Th	23	34	40.03	9.166	2	44	21.8	59.14	16	6.82	8.85	9 29.63	0.690	23	25 10.40
15	Fr	23	38	19.88	9.155	2	20	41.6	59.20	16	6.56	8.85	9 12.93	0.701	23	29 6.96
16	Sa	23	41	59.48	9.145	1	57	0.2	59.24	16	6.29	8.84	8 55.97	0.711	23	33 3.51
17	Su	23	45	38.84	9.135	1	33	18.0	59.27	16	6.03	8.84	8 38.78	0.721	23	37 0.06
18	Mo	23	49	17.98	9.127	−1	9	35.2	+59.29	16	5.77	8.84	−8 21.37	+0.730	23	40 56.61
19	Tu	23	52	56.92	9.119	0	45	52.3	59.28	16	5.50	8.84	8 3.76	0.738	23	44 53.17
20	We	23	56	35.68	9.112	−0	22	9.6	59.27	16	5.24	8.83	7 45.96	0.745	23	48 49.72
21	Th	0	0	14.28	9.105	+0	1	32.6	59.24	16	4.97	8.83	7 28.00	0.751	23	52 46.27
22	Fr	0	3	52.74	9.100	0	25	13.8	59.19	16	4.70	8.83	7 9.91	0.756	23	56 42.83
23	Sa	0	7	31.08	9.096	+0	48	53.7	+59.13	16	4.43	8.83	−6 51.70	+0.761	0	0 39.38
24	Su	0	11	9.33	9.092	1	12	32.1	59.06	16	4.16	8.82	6 33.40	0.764	0	4 35.93
25	Mo	0	14	47.51	9.090	1	36	8.5	58.97	16	3.89	8.82	6 15.03	0.766	0	8 32.48
26	Tu	0	18	25.65	9.088	1	59	42.6	58.87	16	3.62	8.82	5 56.61	0.768	0	12 29.04
27	We	0	22	3.75	9.088	2	23	14.1	58.75	16	3.34	8.82	5 38.17	0.769	0	16 25.59
28	Th	0	25	41.86	9.088	+2	46	42.7	+58.62	16	3.07	8.81	−5 19.72	+0.768	0	20 22.14
29	Fr	0	29	19.99	9.090	3	10	8.0	58.48	16	2.79	8.81	5 1.29	0.767	0	24 18.69
30	Sa	0	32	58.16	9.092	3	33	29.7	58.32	16	2.51	8.81	4 42.91	0.764	0	28 15.25
31	Su	0	36	36.40	9.095	3	56	47.5	58.15	16	2.23	8.81	4 24.60	0.761	0	32 11.80
Apr. 1	Mo	0	40	14.73	9.099	4	20	0.9	57.96	16	1.95	8.80	4 6.37	0.757	0	36 8.35
2	Tu	0	43	53.17	9.104	+4	43	9.7	+57.76	16	1.67	8.80	−3 48.26	+0.752	0	40 4.91
3	We	0	47	31.74	9.110	+5	6	13.6	+57.55	16	1.39	8.80	−3 30.28	+0.746	0	44 1.46

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.			Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		°	'	"	"	"			"	"	"	23° 28'	h m s
Feb. 16	47	327	1	36.0	151.41	+0.44	9.994 8272	+36.4	6.37	+18.52	20.71	59.85	2 16 57.49
17	48	328	2	9.0	151.34	0.36	9.994 9153	37.0	6.51	18.50	20.71	59.86	2 13 1.58
18	49	329	2	40.2	151.26	0.25	9.995 0048	37.6	6.65	18.48	20.70	59.86	2 9 5.67
19	50	330	3	9.6	151.18	+0.12	9.995 0959	38.3	6.79	18.46	20.70	59.87	2 5 9.76
20	51	331	3	37.0	151.11	-0.01	9.995 1886	39.0	6.92	18.44	20.69	59.88	2 1 13.85
21	52	332	4	2.7	151.03	-0.14	9.995 2831	+39.7	7.06	+18.42	20.69	59.88	1 57 17.94
22	53	333	4	26.5	150.95	0.26	9.995 3793	40.4	7.20	18.40	20.68	59.89	1 53 22.04
23	54	334	4	48.4	150.88	0.36	9.995 4772	41.2	7.34	18.37	20.68	59.90	1 49 26.13
24	55	335	5	8.6	150.81	0.45	9.995 5770	42.0	7.47	18.34	20.67	59.90	1 45 30.22
25	56	336	5	27.1	150.73	0.53	9.995 6787	42.7	7.61	18.31	20.67	59.91	1 41 34.31
26	57	337	5	43.8	150.66	-0.58	9.995 7821	+43.4	7.75	+18.29	20.66	59.91	1 37 38.40
27	58	338	5	58.8	150.59	0.60	9.995 8872	44.2	7.89	18.26	20.66	59.92	1 33 42.50
28	59	339	6	12.1	150.52	0.59	9.995 9941	44.9	8.02	18.22	20.65	59.92	1 29 46.59
Mar. 1	60	340	6	23.7	150.45	0.56	9.996 1025	45.5	8.16	18.19	20.65	59.93	1 25 50.68
2	61	341	6	33.8	150.39	0.50	9.996 2125	46.1	8.30	18.16	20.64	59.93	1 21 54.78
3	62	342	6	42.2	150.32	-0.42	9.996 3240	+46.7	8.44	+18.12	20.64	59.93	1 17 58.87
4	63	343	6	49.1	150.25	0.32	9.996 4368	47.2	8.57	18.09	20.63	59.93	1 14 2.96
5	64	344	6	54.4	150.19	0.21	9.996 5508	47.7	8.71	18.05	20.63	59.93	1 10 7.05
6	65	345	6	58.1	150.12	-0.09	9.996 6658	48.1	8.85	18.01	20.62	59.93	1 6 11.15
7	66	346	7	0.2	150.06	+0.04	9.996 7817	48.4	8.98	17.97	20.62	59.93	1 2 15.24
8	67	347	7	0.8	149.99	+0.16	9.996 8983	+48.7	9.12	+17.93	20.61	59.93	0 58 19.33
9	68	348	6	59.7	149.92	0.27	9.997 0155	48.9	9.26	17.89	20.61	59.93	0 54 23.43
10	69	349	6	56.9	149.85	0.37	9.997 1330	49.0	9.40	17.85	20.60	59.93	0 50 27.52
11	70	350	6	52.4	149.77	0.44	9.997 2508	49.1	9.54	17.81	20.59	59.92	0 46 31.61
12	71	351	6	46.1	149.70	0.48	9.997 3686	49.1	9.68	17.77	20.59	59.92	0 42 35.70
13	72	352	6	37.9	149.61	+0.48	9.997 4865	+49.1	9.81	+17.73	20.58	59.91	0 38 39.80
14	73	353	6	27.6	149.53	0.45	9.997 6043	49.1	9.95	17.69	20.58	59.91	0 34 43.89
15	74	354	6	15.2	149.44	0.40	9.997 7222	49.1	10.09	17.64	20.57	59.91	0 30 47.98
16	75	355	6	0.7	149.35	0.32	9.997 8402	49.2	10.23	17.60	20.57	59.90	0 26 52.08
17	76	356	5	43.9	149.25	0.20	9.997 9584	49.3	10.36	17.56	20.56	59.89	0 22 56.17
18	77	357	5	24.8	149.16	+0.07	9.998 0768	+49.4	10.50	+17.51	20.56	59.89	0 19 0.26
19	78	358	5	3.5	149.06	-0.06	9.998 1956	49.6	10.64	17.47	20.55	59.88	0 15 4.36
20	79	359	4	39.8	148.97	0.19	9.998 3148	49.8	10.78	17.42	20.54	59.87	0 11 8.45
21	80	0	4	13.9	148.87	0.32	9.998 4346	50.1	10.91	17.38	20.54	59.86	0 7 12.54
22	81	1	3	45.7	148.78	0.43	9.998 5551	50.3	11.05	17.34	20.53	59.85	{ 0 3 16.64 23 59 20.73
23	82	2	3	15.2	148.68	-0.52	9.998 6762	+50.6	11.19	+17.29	20.53	59.84	23 55 24.82
24	83	3	2	42.5	148.59	0.59	9.998 7980	50.9	11.33	17.25	20.52	59.83	23 51 28.92
25	84	4	2	7.7	148.50	0.64	9.998 9205	51.2	11.46	17.20	20.52	59.82	23 47 33.01
26	85	5	1	30.7	148.41	0.66	9.999 0437	51.5	11.60	17.16	20.51	59.80	23 43 37.10
27	86	6	0	51.6	148.33	0.66	9.999 1677	51.8	11.74	17.12	20.50	59.79	23 39 41.19
28	87	7	0	10.5	148.25	-0.63	9.999 2924	+52.1	11.88	+17.07	20.50	59.77	23 35 45.29
29	88	7	59	27.4	148.16	0.58	9.999 4177	52.3	12.01	17.03	20.49	59.76	23 31 49.38
30	89	8	58	42.3	148.08	0.50	9.999 5436	52.6	12.15	16.99	20.49	59.75	23 27 53.47
31	90	9	57	55.3	148.00	0.40	9.999 6701	52.8	12.29	16.95	20.48	59.73	23 23 57.57
Apr. 1	91	10	57	6.5	147.93	0.29	9.999 7971	53.0	12.43	16.90	20.47	59.72	23 20 1.66
2	92	11	56	15.9	147.85	-0.17	9.999 9243	+53.1	12.57	+16.86	20.47	59.70	23 16 5.75
3	93	12	55	23.4	147.78	-0.05	0.000 0518	+53.1	12.70	+16.82	20.46	59.68	23 12 9.84

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.					
		h	m	s	s	°	'	"	"	'	"	m	s	h	m	s			
Apr. 1	Mo	0	40	14.73	9.099	+	4	20	0.9	+57.96	16	1.95	8.80	−4	6.37	+0.757	0	36	8.35
2	Tu	0	43	53.17	9.104		4	43	9.7	57.76	16	1.67	8.80	3	48.26	0.752	0	40	4.91
3	We	0	47	31.74	9.110		5	6	13.6	57.55	16	1.39	8.80	3	30.28	0.746	0	44	1.46
4	Th	0	51	10.46	9.117		5	29	12.1	57.32	16	1.10	8.80	3	12.45	0.739	0	47	58.01
5	Fr	0	54	49.36	9.125		5	52	5.0	57.08	16	0.82	8.79	2	54.80	0.731	0	51	54.56
6	Sa	0	58	28.45	9.133	+	6	14	52.0	+56.82	16	0.54	8.79	−2	37.34	+0.723	0	55	51.12
7	Su	1	2	7.75	9.142		6	37	32.5	56.55	16	0.26	8.79	2	20.08	0.714	0	59	47.67
8	Mo	1	5	47.28	9.152		7	0	6.3	56.26	15	59.98	8.79	2	3.06	0.704	1	3	44.22
9	Tu	1	9	27.05	9.162		7	22	33.0	55.96	15	59.71	8.78	1	46.28	0.694	1	7	40.78
10	We	1	13	7.08	9.173		7	44	52.3	55.64	15	59.43	8.78	1	29.75	0.683	1	11	37.33
11	Th	1	16	47.37	9.185	+	8	7	3.7	+55.31	15	59.16	8.78	−1	13.49	+0.672	1	15	33.88
12	Fr	1	20	27.94	9.197		8	29	7.0	54.96	15	58.89	8.78	0	57.51	0.660	1	19	30.44
13	Sa	1	24	8.81	9.209		8	51	1.7	54.59	15	58.62	8.77	0	41.82	0.648	1	23	26.99
14	Su	1	27	49.97	9.222		9	12	47.4	54.21	15	58.36	8.77	0	26.43	0.635	1	27	23.54
15	Mo	1	31	31.45	9.235		9	34	23.9	53.82	15	58.10	8.77	−0	11.36	0.621	1	31	20.10
16	Tu	1	35	13.26	9.249	+	9	55	50.8	+53.41	15	57.84	8.77	+0	3.39	+0.607	1	35	16.65
17	We	1	38	55.41	9.264		10	17	7.8	52.99	15	57.58	8.76	0	17.79	0.592	1	39	13.20
18	Th	1	42	37.92	9.279		10	38	14.5	52.56	15	57.32	8.76	0	31.83	0.577	1	43	9.76
19	Fr	1	46	20.80	9.295		10	59	10.6	52.11	15	57.06	8.76	0	45.51	0.562	1	47	6.31
20	Sa	1	50	4.07	9.311		11	19	55.8	51.65	15	56.81	8.76	0	58.80	0.545	1	51	2.86
21	Su	1	53	47.74	9.328	+	11	40	29.8	+51.17	15	56.55	8.75	+1	11.68	+0.528	1	54	59.42
22	Mo	1	57	31.82	9.346		12	0	52.2	50.69	15	56.30	8.75	1	24.15	0.511	1	58	55.97
23	Tu	2	1	16.34	9.364		12	21	2.7	50.19	15	56.05	8.75	1	36.19	0.492	2	2	52.53
24	We	2	5	1.30	9.383		12	41	1.1	49.67	15	55.80	8.75	1	47.78	0.473	2	6	49.08
25	Th	2	8	46.72	9.402		13	0	47.0	49.15	15	55.55	8.75	1	58.91	0.454	2	10	45.63
26	Fr	2	12	32.62	9.422	+	13	20	20.1	+48.61	15	55.30	8.74	+2	9.57	+0.434	2	14	42.19
27	Sa	2	16	19.00	9.443		13	39	40.1	48.05	15	55.05	8.74	2	19.74	0.413	2	18	38.74
28	Su	2	20	5.89	9.464		13	58	46.7	47.49	15	54.80	8.74	2	29.41	0.392	2	22	35.30
29	Mo	2	23	53.29	9.486		14	17	39.5	46.91	15	54.55	8.74	2	38.56	0.370	2	26	31.85
30	Tu	2	27	41.22	9.508		14	36	18.3	46.32	15	54.31	8.73	2	47.19	0.348	2	30	28.41
May 1	We	2	31	29.69	9.531	+	14	54	42.7	+45.71	15	54.06	8.73	+2	55.27	+0.325	2	34	24.96
2	Th	2	35	18.71	9.554		15	12	52.5	45.10	15	53.82	8.73	3	2.80	0.302	2	38	21.52
3	Fr	2	39	8.29	9.578		15	30	47.3	44.46	15	53.58	8.73	3	9.78	0.279	2	42	18.07
4	Sa	2	42	58.44	9.601		15	48	26.7	43.82	15	53.34	8.72	3	16.19	0.255	2	46	14.63
5	Su	2	46	49.16	9.626		16	5	50.6	43.16	15	53.10	8.72	3	22.02	0.231	2	50	11.18
6	Mo	2	50	40.47	9.650	+	16	22	58.5	+42.49	15	52.87	8.72	+3	27.27	+0.207	2	54	7.74
7	Tu	2	54	32.35	9.675		16	39	50.1	41.80	15	52.64	8.72	3	31.94	0.182	2	58	4.29
8	We	2	58	24.82	9.698		16	56	25.1	41.10	15	52.41	8.72	3	36.03	0.158	3	2	0.85
9	Th	3	2	17.87	9.721		17	12	43.2	40.40	15	52.19	8.71	3	39.53	0.134	3	5	57.40
10	Fr	3	6	11.50	9.746		17	28	44.1	39.67	15	51.98	8.71	3	42.46	0.110	3	9	53.96
11	Sa	3	10	5.70	9.770	+	17	44	27.5	+38.94	15	51.76	8.71	+3	44.81	+0.086	3	13	50.51
12	Su	3	14	0.47	9.794		17	59	53.0	38.18	15	51.55	8.71	3	46.59	0.062	3	17	47.07
13	Mo	3	17	55.81	9.817		18	15	0.3	37.42	15	51.35	8.71	3	47.81	0.039	3	21	43.63
14	Tu	3	21	51.71	9.841		18	29	49.2	36.65	15	51.15	8.70	3	48.47	+0.016	3	25	40.18
15	We	3	25	48.17	9.864		18	44	19.4	35.86	15	50.95	8.70	3	48.57	−0.008	3	29	36.74
16	Th	3	29	45.18	9.887	+	18	58	30.5	+35.06	15	50.76	8.70	+3	48.11	−0.031	3	33	33.29
17	Fr	3	33	42.74	9.910	+	19	12	22.4	+34.25	15	50.57	8.70	+3	47.10	−0.053	3	37	29.85

Mean Time
of Sidereal
Noon.

h	m	s
23	20	1.66
23	16	5.75
23	12	9.84
23	8	13.94
23	4	18.03
23	0	22.12
22	56	26.22
22	52	30.31
22	48	34.40
22	44	38.50
22	40	42.59
22	36	46.68
22	32	50.77
22	28	54.87
22	24	58.96
22	21	3.05
22	17	7.14
22	13	11.24
22	9	15.33
22	5	19.42
22	1	23.51
21	57	27.60
21	53	31.70
21	49	35.79
21	45	39.88
21	41	43.97
21	37	48.06
21	33	52.15
21	29	56.24
21	26	0.34
21	22	4.43
21	18	8.52
21	14	12.61
21	10	16.70
21	6	20.79
21	2	24.88
20	58	28.97
20	54	33.06
20	50	37.15
20	46	41.24
20	42	45.33
20	38	49.42
20	34	53.51
20	30	57.60
20	27	1.69
20	23	5.78
20	19	9.87

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.		Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.		
		h	m	s	s	°	'	"	"	'	"	m	s	s	h	m	s
May 17	Fr	3	33	42.74	9.910	+19	12	22.4	+34.25	15 50.57	8.70	+3	47.10	−0.053	3	37	29.85
18	Sa	3	37	40.85	9.932	19	25	54.7	33.44	15 50.38	8.70	3	45.55	0.076	3	41	26.40
19	Su	3	41	39.50	9.955	19	39	7.3	32.61	15 50.20	8.70	3	43.46	0.098	3	45	22.96
20	Mo	3	45	38.68	9.977	19	51	59.8	31.76	15 50.02	8.69	3	40.84	0.120	3	49	19.52
21	Tu	3	49	38.39	9.999	20	4	31.9	30.91	15 49.85	8.69	3	37.68	0.142	3	53	16.07
22	We	3	53	38.63	10.021	+20	16	43.5	+30.05	15 49.67	8.69	+3	34.00	−0.164	3	57	12.63
23	Th	3	57	39.39	10.042	20	28	34.3	29.18	15 49.50	8.69	3	29.80	0.186	4	1	9.19
24	Fr	4	1	40.67	10.064	20	40	4.1	28.30	15 49.33	8.69	3	25.08	0.207	4	5	5.74
25	Sa	4	5	42.45	10.085	20	51	12.7	27.41	15 49.16	8.69	3	19.85	0.228	4	9	2.30
26	Su	4	9	44.73	10.105	21	1	59.8	26.51	15 49.00	8.69	3	14.13	0.249	4	12	58.86
27	Mo	4	13	47.51	10.126	+21	12	25.1	+25.60	15 48.84	8.68	+3	7.91	−0.269	4	16	55.41
28	Tu	4	17	50.77	10.146	21	22	28.6	24.68	15 48.68	8.68	3	1.20	0.289	4	20	51.97
29	We	4	21	54.51	10.166	21	32	9.9	23.76	15 48.52	8.68	2	54.02	0.309	4	24	48.53
30	Th	4	25	58.72	10.185	21	41	28.9	22.82	15 48.36	8.68	2	46.36	0.329	4	28	45.09
31	Fr	4	30	3.39	10.204	21	50	25.4	21.88	15 48.21	8.68	2	38.25	0.347	4	32	41.64
June 1	Sa	4	34	8.51	10.222	+21	58	59.1	+20.93	15 48.07	8.68	+2	29.69	−0.366	4	36	38.20
2	Su	4	38	14.06	10.240	22	7	9.9	19.97	15 47.92	8.68	2	20.70	0.383	4	40	34.76
3	Mo	4	42	20.02	10.257	22	14	57.6	19.00	15 47.78	8.67	2	11.30	0.400	4	44	31.31
4	Tu	4	46	26.38	10.273	22	22	22.0	18.03	15 47.64	8.67	2	1.49	0.416	4	48	27.87
5	We	4	50	33.12	10.288	22	29	22.9	17.05	15 47.51	8.67	1	51.31	0.432	4	52	24.43
6	Th	4	54	40.22	10.303	+22	36	0.2	+16.06	15 47.39	8.67	+1	40.77	−0.446	4	56	20.99
7	Fr	4	58	47.65	10.316	22	42	13.8	15.07	15 47.27	8.67	1	29.89	0.460	5	0	17.54
8	Sa	5	2	55.39	10.329	22	48	3.5	14.07	15 47.15	8.67	1	18.71	0.472	5	4	14.10
9	Su	5	7	3.42	10.340	22	53	29.2	13.07	15 47.04	8.67	1	7.24	0.483	5	8	10.66
10	Mo	5	11	11.70	10.350	22	58	30.7	12.06	15 46.94	8.67	0	55.51	0.494	5	12	7.22
11	Tu	5	15	20.22	10.359	+23	3	7.9	+11.04	15 46.84	8.67	+0	43.55	−0.503	5	16	3.77
12	We	5	19	28.95	10.367	23	7	20.8	10.03	15 46.74	8.66	0	31.38	0.511	5	20	0.33
13	Th	5	23	37.86	10.375	23	11	9.3	9.01	15 46.65	8.66	0	19.02	0.518	5	23	56.89
14	Fr	5	27	46.93	10.381	23	14	33.3	7.99	15 46.57	8.66	+0	6.51	0.524	5	27	53.45
15	Sa	5	31	56.14	10.386	23	17	32.7	6.96	15 46.49	8.66	−0	6.13	0.529	5	31	50.00
16	Su	5	36	5.46	10.390	+23	20	7.4	+ 5.93	15 46.42	8.66	−0	18.89	−0.534	5	35	46.56
17	Mo	5	40	14.86	10.393	23	22	17.5	4.91	15 46.35	8.66	0	31.74	0.537	5	39	43.12
18	Tu	5	44	24.33	10.395	23	24	2.9	3.88	15 46.28	8.66	0	44.65	0.539	5	43	39.68
19	We	5	48	33.84	10.397	23	25	23.5	2.84	15 46.22	8.66	0	57.61	0.540	5	47	36.23
20	Th	5	52	43.38	10.397	23	26	19.4	1.81	15 46.16	8.66	1	10.59	0.541	5	51	32.79
21	Fr	5	56	52.91	10.397	+23	26	50.5	+ 0.78	15 46.10	8.66	−1	23.56	−0.540	5	55	29.35
22	Sa	6	1	2.42	10.395	23	26	56.8	− 0.25	15 46.05	8.66	1	36.51	0.539	5	59	25.91
23	Su	6	5	11.89	10.393	23	26	38.3	1.29	15 46.00	8.66	1	49.42	0.537	6	3	22.46
24	Mo	6	9	21.29	10.390	23	25	55.1	2.32	15 45.96	8.66	2	2.27	0.534	6	7	19.02
25	Tu	6	13	30.62	10.386	23	24	47.1	3.35	15 45.91	8.66	2	15.04	0.530	6	11	15.58
26	We	6	17	39.84	10.382	+23	23	14.4	− 4.38	15 45.87	8.66	−2	27.71	−0.525	6	15	12.14
27	Th	6	21	48.95	10.377	23	21	17.0	5.40	15 45.84	8.66	2	40.25	0.520	6	19	8.69
28	Fr	6	25	57.92	10.370	23	18	55.0	6.43	15 45.81	8.66	2	52.66	0.514	6	23	5.25
29	Sa	6	30	6.73	10.363	23	16	8.3	7.45	15 45.78	8.66	3	4.92	0.507	6	27	1.81
30	Su	6	34	15.36	10.356	23	12	57.2	8.47	15 45.75	8.66	3	17.00	0.499	6	30	58.37
July 1	Mo	6	38	23.80	10.347	+23	9	21.6	− 9.49	15 45.73	8.66	−3	28.88	−0.490	6	34	54.93
2	Tu	6	42	32.02	10.337	+23	5	21.6	−10.51	15 45.71	8.66	−3	40.54	−0.481	6	38	51.48

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ' "	"	"			"	"	"	23° 26' "	h m s
May 17	137	55 45 54.6	144.50	-0.68	0.004 9665	+35.7	18.76	+16.10	20.23	58.56	20 19 9.87
18	138	56 43 41.5	144.43	0.74	0.005 0515	35.1	18.89	16.11	20.23	58.53	20 15 13.96
19	139	57 41 26.9	144.36	0.77	0.005 1350	34.5	19.03	16.13	20.22	58.51	20 11 18.05
20	140	58 39 10.6	144.29	0.77	0.005 2173	34.0	19.17	16.14	20.22	58.48	20 7 22.14
21	141	59 36 52.7	144.23	0.75	0.005 2982	33.5	19.31	16.16	20.22	58.45	20 3 26.23
22	142	60 34 33.4	144.16	-0.70	0.005 3780	+33.0	19.44	+16.18	20.21	58.43	19 59 30.32
23	143	61 32 12.6	144.10	0.62	0.005 4565	32.5	19.58	16.20	20.21	58.40	19 55 34.41
24	144	62 29 50.4	144.05	0.52	0.005 5340	32.1	19.72	16.22	20.21	58.38	19 51 38.50
25	145	63 27 26.9	144.00	0.40	0.005 6104	31.6	19.86	16.24	20.20	58.35	19 47 42.59
26	146	64 25 2.2	143.95	0.28	0.005 6857	31.2	19.99	16.26	20.20	58.33	19 43 46.68
27	147	65 22 36.3	143.90	-0.15	0.005 7600	+30.7	20.13	+16.28	20.19	58.30	19 39 50.77
28	148	66 20 9.3	143.86	-0.01	0.005 8331	30.2	20.27	16.31	20.19	58.28	19 35 54.86
29	149	67 17 41.4	143.82	+0.12	0.005 9050	29.7	20.41	16.33	20.19	58.26	19 31 58.95
30	150	68 15 12.5	143.78	0.23	0.005 9757	29.2	20.54	16.36	20.18	58.23	19 28 3.04
31	151	69 12 42.9	143.75	0.32	0.006 0450	28.6	20.68	16.39	20.18	58.21	19 24 7.12
June 1	152	70 10 12.4	143.72	+0.38	0.006 1128	+27.9	20.82	+16.42	20.18	58.19	19 20 11.21
2	153	71 7 41.3	143.69	0.41	0.006 1789	27.2	20.96	16.45	20.18	58.17	19 16 15.30
3	154	72 5 9.5	143.66	0.41	0.006 2432	26.4	21.09	16.48	20.17	58.15	19 12 19.39
4	155	73 2 37.0	143.63	0.38	0.006 3055	25.5	21.23	16.51	20.17	58.13	19 8 23.48
5	156	74 0 3.9	143.61	0.31	0.006 3657	24.6	21.37	16.54	20.17	58.11	19 4 27.57
6	157	74 57 30.1	143.58	+0.21	0.006 4235	+23.6	21.51	+16.57	20.16	58.09	19 0 31.66
7	158	75 54 55.5	143.55	+0.10	0.006 4790	22.6	21.64	16.60	20.16	58.07	18 56 35.74
8	159	76 52 20.3	143.51	-0.03	0.006 5320	21.6	21.78	16.64	20.16	58.05	18 52 39.83
9	160	77 49 44.2	143.48	0.18	0.006 5825	20.5	21.92	16.67	20.16	58.03	18 48 43.92
10	161	78 47 7.4	143.45	0.32	0.006 6305	19.5	22.06	16.70	20.15	58.02	18 44 48.01
11	162	79 44 29.7	143.41	-0.44	0.006 6761	+18.5	22.19	+16.74	20.15	58.00	18 40 52.10
12	163	80 41 51.1	143.37	0.55	0.006 7192	17.5	22.33	16.77	20.15	57.98	18 36 56.19
13	164	81 39 11.6	143.34	0.64	0.006 7600	16.5	22.47	16.81	20.15	57.97	18 33 0.28
14	165	82 36 31.2	143.30	0.70	0.006 7986	15.6	22.61	16.85	20.15	57.95	18 29 4.36
15	166	83 33 49.9	143.26	0.74	0.006 8350	14.8	22.75	16.88	20.14	57.94	18 25 8.45
16	167	84 31 7.8	143.23	-0.75	0.006 8694	+13.9	22.88	+16.92	20.14	57.93	18 21 12.54
17	168	85 28 24.8	143.19	0.73	0.006 9018	13.1	23.02	16.96	20.14	57.91	18 17 16.63
18	169	86 25 41.1	143.16	0.69	0.006 9324	12.4	23.16	17.00	20.14	57.90	18 13 20.72
19	170	87 22 56.6	143.13	0.62	0.006 9612	11.6	23.30	17.03	20.14	57.89	18 9 24.80
20	171	88 20 11.4	143.10	0.53	0.006 9882	10.9	23.43	17.07	20.14	57.88	18 5 28.89
21	172	89 17 25.5	143.08	-0.41	0.007 0137	+10.3	23.57	+17.11	20.14	57.87	18 1 32.98
22	173	90 14 39.1	143.06	0.28	0.007 0376	9.6	23.71	17.14	20.14	57.86	17 57 37.07
23	174	91 11 52.2	143.04	0.14	0.007 0600	9.0	23.85	17.18	20.13	57.85	17 53 41.16
24	175	92 9 4.9	143.02	-0.01	0.007 0810	8.5	23.98	17.22	20.13	57.84	17 49 45.25
25	176	93 6 17.3	143.01	+0.12	0.007 1006	7.9	24.12	17.26	20.13	57.83	17 45 49.33
26	177	94 3 29.4	143.00	+0.24	0.007 1188	+ 7.3	24.26	+17.29	20.13	57.82	17 41 53.42
27	178	95 0 41.4	143.00	0.34	0.007 1355	6.6	24.40	17.33	20.13	57.81	17 37 57.51
28	179	95 57 53.4	143.00	0.41	0.007 1507	6.0	24.53	17.37	20.13	57.81	17 34 1.60
29	180	96 55 5.5	143.00	0.45	0.007 1643	5.3	24.67	17.41	20.13	57.80	17 30 5.69
30	181	97 52 17.6	143.01	0.46	0.007 1760	4.5	24.81	17.44	20.13	57.80	17 26 9.77
July 1	182	98 49 30.0	143.02	+0.44	0.007 1859	+ 3.7	24.95	+17.48	20.13	57.79	17 22 13.86
2	183	99 46 42.6	143.03	+0.38	0.007 1937	+ 2.8	25.08	+17.51	20.13	57.79	17 18 17.95

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.			
		h	m	s	s	°	'	"	"	'	"	m	s	s	h	m	s
July	1	Mo	6	38	23.80	10.347	+23	9	21.6	- 9.49	15 45.73	8.66	-3 28.88	-0.490	6	34	54.93
	2	Tu	6	42	32.02	10.337	23	5	21.6	10.51	15 45.71	8.66	3 40.54	0.481	6	38	51.48
	3	We	6	46	40.00	10.327	23	0	57.3	11.52	15 45.70	8.66	3 51.96	0.470	6	42	48.04
	4	Th	6	50	47.71	10.315	22	56	8.9	12.52	15 45.69	8.65	4 3.11	0.459	6	46	44.60
	5	Fr	6	54	55.13	10.303	22	50	56.4	13.52	15 45.69	8.65	4 13.98	0.446	6	50	41.16
	6	Sa	6	59	2.24	10.289	+22	45	20.1	-14.51	15 45.69	8.65	-4 24.53	-0.433	6	54	37.71
	7	Su	7	3	9.02	10.275	22	39	20.0	15.49	15 45.70	8.66	4 34.75	0.418	6	58	34.27
	8	Mo	7	7	15.44	10.259	22	32	56.4	16.47	15 45.72	8.66	4 44.61	0.403	7	2	30.83
	9	Tu	7	11	21.47	10.243	22	26	9.3	17.45	15 45.74	8.66	4 54.08	0.386	7	6	27.38
	10	We	7	15	27.09	10.225	22	18	59.0	18.41	15 45.76	8.66	5 3.15	0.369	7	10	23.94
	11	Th	7	19	32.29	10.207	+22	11	25.6	-19.37	15 45.80	8.66	-5 11.79	-0.351	7	14	20.50
	12	Fr	7	23	37.05	10.189	22	3	29.3	20.32	15 45.83	8.66	5 19.92	0.333	7	18	17.06
	13	Sa	7	27	41.34	10.169	21	55	10.3	21.26	15 45.88	8.66	5 27.73	0.312	7	22	13.61
	14	Su	7	31	45.15	10.148	21	46	28.9	22.19	15 45.92	8.66	5 34.98	0.292	7	26	10.17
	15	Mo	7	35	48.46	10.127	21	37	25.2	23.11	15 45.98	8.66	5 41.73	0.271	7	30	6.73
	16	Tu	7	39	51.26	10.106	+21	27	59.4	-24.03	15 46.03	8.66	-5 47.98	-0.249	7	34	3.28
	17	We	7	43	53.54	10.084	21	18	11.8	24.94	15 46.10	8.66	5 53.70	0.227	7	37	59.84
	18	Th	7	47	55.28	10.061	21	8	2.5	25.83	15 46.16	8.66	5 58.89	0.205	7	41	56.40
	19	Fr	7	51	56.48	10.038	20	57	31.8	26.72	15 46.23	8.66	6 3.53	0.182	7	45	52.95
	20	Sa	7	55	57.12	10.015	20	46	40.0	27.60	15 46.30	8.66	6 7.61	0.158	7	49	49.51
	21	Su	7	59	57.19	9.991	+20	35	27.1	-28.47	15 46.38	8.66	-6 11.13	-0.135	7	53	46.07
	22	Mo	8	3	56.70	9.963	20	23	53.6	29.32	15 46.46	8.66	6 14.08	0.111	7	57	42.62
	23	Tu	8	7	55.64	9.944	20	11	59.5	30.18	15 46.54	8.66	6 16.46	0.087	8	1	39.18
	24	We	8	11	53.99	9.919	19	59	45.2	31.01	15 46.63	8.66	6 18.26	0.063	8	5	35.74
	25	Th	8	15	51.77	9.895	19	47	10.8	31.84	15 46.71	8.66	6 19.48	0.039	8	9	32.29
	26	Fr	8	19	48.97	9.871	+19	34	16.7	-32.66	15 46.81	8.67	-6 20.12	-0.015	8	13	28.85
	27	Sa	8	23	45.59	9.847	19	21	3.0	33.48	15 46.90	8.67	6 20.19	+0.009	8	17	25.40
	28	Su	8	27	41.63	9.823	19	7	29.9	34.27	15 47.00	8.67	6 19.67	0.034	8	21	21.96
	29	Mo	8	31	37.09	9.799	18	53	37.9	35.06	15 47.10	8.67	6 18.57	0.053	8	25	18.52
	30	Tu	8	35	31.97	9.774	18	39	27.0	35.84	15 47.20	8.67	6 16.89	0.082	8	29	15.07
	31	We	8	39	26.26	9.750	+18	24	57.6	-36.60	15 47.31	8.67	-3 14.63	+0.106	8	33	11.63
Aug.	1	Th	8	43	19.96	9.725	18	10	10.1	37.35	15 47.42	8.67	6 11.78	0.131	8	37	8.18
	2	Fr	8	47	13.08	9.701	17	55	4.6	38.10	15 47.54	8.67	6 8.34	0.156	8	41	4.74
	3	Sa	8	51	5.61	9.676	17	39	41.5	38.82	15 47.66	8.67	6 4.31	0.180	8	45	1.30
	4	Su	8	54	57.54	9.651	17	24	1.1	39.54	15 47.79	8.67	5 59.69	0.205	8	48	57.85
	5	Mo	8	58	48.88	9.627	+17	8	3.7	-40.24	15 47.92	8.68	-5 54.48	+0.230	8	52	54.41
	6	Tu	9	2	39.63	9.602	16	51	49.6	40.93	15 48.06	8.68	5 48.67	0.255	8	56	50.96
	7	We	9	6	29.78	9.577	16	35	19.2	41.60	15 48.20	8.68	5 42.26	0.279	9	0	47.52
	8	Th	9	10	19.33	9.552	16	18	32.8	42.26	15 48.35	8.68	5 35.26	0.304	9	4	44.07
	9	Fr	9	14	8.29	9.528	16	1	30.6	42.91	15 48.50	8.68	5 27.67	0.329	9	8	40.63
	10	Sa	9	17	56.66	9.503	+15	44	13.0	-43.55	15 48.66	8.68	-5 19.48	+0.353	9	12	37.18
	11	Su	9	21	44.45	9.479	15	26	40.3	44.17	15 48.82	8.68	5 10.71	0.378	9	16	33.74
	12	Mo	9	25	31.65	9.455	15	8	52.9	44.78	15 48.99	8.69	5 1.36	0.402	9	20	30.29
	13	Tu	9	29	18.27	9.431	14	50	51.1	45.37	15 49.16	8.69	4 51.43	0.426	9	24	26.85
	14	We	9	33	4.33	9.407	14	32	35.1	45.95	15 49.33	8.69	4 40.92	0.449	9	28	23.40
	15	Th	9	36	49.82	9.384	+14	14	5.3	-46.52	15 49.51	8.69	-4 29.86	+0.472	9	32	19.95
	16	Fr	9	40	34.76	9.361	+13	55	22.0	-47.08	15 49.69	8.69	-4 18.25	+0.495	9	36	16.51

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliq-uity.	Mean Time of Sidereal Noon.
		° ' "	"	"			"	"	"	23° 26' "	h m s
July 1	182	98 49 30.0	143.02	+0.44	0.007 1859	+ 3.7	24.95	+17.48	20.13	57.79	17 22 13.86
2	183	99 46 42.6	143.03	0.38	0.007 1937	2.8	25.08	17.51	20.13	57.79	17 18 17.95
3	184	100 43 55.4	143.04	0.29	0.007 1993	1.9	25.22	17.55	20.13	57.78	17 14 22.04
4	185	101 41 8.4	143.06	0.18	0.007 2026	+ 0.9	25.36	17.58	20.13	57.78	17 10 26.13
5	186	102 38 21.7	143.06	+0.05	0.007 2034	- 0.2	25.50	17.62	20.13	57.78	17 6 30.22
6	187	103 35 35.2	143.07	-0.08	0.007 2017	- 1.3	25.63	+17.65	20.13	57.78	17 2 34.31
7	188	104 32 48.9	143.07	0.22	0.007 1974	2.4	25.77	17.68	20.13	57.78	16 58 38.39
8	189	105 30 2.7	143.08	0.35	0.007 1904	3.5	25.91	17.71	20.13	57.78	16 54 42.48
9	190	106 27 16.6	143.08	0.46	0.007 1808	4.6	26.05	17.74	20.13	57.77	16 50 46.57
10	191	107 24 30.7	143.09	0.56	0.007 1685	5.6	26.18	17.77	20.13	57.77	16 46 50.66
11	192	108 21 44.8	143.09	-0.63	0.007 1538	- 6.7	26.32	+17.80	20.13	57.78	16 42 54.75
12	193	109 18 58.9	143.09	0.68	0.007 1365	7.7	26.46	17.83	20.13	57.78	16 38 58.84
13	194	110 16 13.2	143.10	0.70	0.007 1169	8.6	26.60	17.86	20.13	57.78	16 35 2.93
14	195	111 13 27.5	143.10	0.70	0.007 0950	9.6	26.74	17.88	20.13	57.78	16 31 7.02
15	196	112 10 41.8	143.10	0.67	0.007 0710	10.5	26.87	17.91	20.13	57.78	16 27 11.10
16	197	113 7 56.3	143.11	-0.61	0.007 0448	-11.3	27.01	+17.94	20.13	57.79	16 23 15.19
17	198	114 5 10.9	143.11	0.51	0.007 0167	12.1	27.15	17.97	20.14	57.79	16 19 19.28
18	199	115 2 25.7	143.12	0.40	0.006 9867	12.9	27.29	17.99	20.14	57.79	16 15 23.37
19	200	115 59 40.7	143.13	0.28	0.006 9549	13.6	27.42	18.01	20.14	57.80	16 11 27.46
20	201	116 56 55.9	143.14	0.16	0.006 9214	14.2	27.56	18.03	20.14	57.80	16 7 31.55
21	202	117 54 11.4	143.16	-0.03	0.006 8865	-14.9	27.70	+18.05	20.14	57.81	16 3 35.64
22	203	118 51 27.4	143.18	+0.11	0.006 8500	15.5	27.84	18.07	20.14	57.81	15 59 39.73
23	204	119 48 43.8	143.20	0.23	0.006 8122	16.0	27.97	18.09	20.15	57.82	15 55 43.82
24	205	120 46 0.8	143.22	0.33	0.006 7731	16.6	28.11	18.10	20.15	57.82	15 51 47.91
25	206	121 43 18.5	143.25	0.41	0.006 7327	17.1	28.25	18.12	20.15	57.83	15 47 52.00
26	207	122 40 37.0	143.29	+0.47	0.006 6910	-17.7	28.39	+18.13	20.15	57.83	15 43 56.09
27	208	123 37 56.3	143.33	0.49	0.006 6479	18.3	28.52	18.15	20.15	57.84	15 40 0.18
28	209	124 35 16.6	143.37	0.47	0.006 6033	18.9	28.66	18.16	20.16	57.85	15 36 4.27
29	210	125 32 38.0	143.41	0.42	0.006 5572	19.6	28.80	18.17	20.16	57.85	15 32 8.36
30	211	126 30 0.5	143.46	0.34	0.006 5093	20.3	28.94	18.18	20.16	57.86	15 28 12.45
31	212	127 27 24.1	143.51	+0.24	0.006 4596	-21.1	29.07	+18.19	20.16	57.87	15 24 16.54
Aug. 1	213	128 24 48.8	143.55	+0.11	0.006 4078	22.0	29.21	18.19	20.16	57.88	15 20 20.63
2	214	129 22 14.7	143.60	-0.02	0.006 3540	22.9	29.35	18.20	20.17	57.89	15 16 24.72
3	215	130 19 41.7	143.65	0.15	0.006 2980	23.8	29.49	18.20	20.17	57.89	15 12 28.81
4	216	131 17 9.8	143.70	0.28	0.006 2397	24.8	29.62	18.20	20.17	57.90	15 8 32.90
5	217	132 14 39.1	143.74	-0.39	0.006 1791	-25.7	29.76	+18.20	20.18	57.91	15 4 36.99
6	218	133 12 9.4	143.78	0.49	0.006 1161	26.7	29.90	18.20	20.18	57.92	15 0 41.08
7	219	134 9 40.7	143.83	0.57	0.006 0508	27.7	30.04	18.20	20.18	57.93	14 56 45.17
8	220	135 7 13.1	143.87	0.63	0.005 9832	28.6	30.17	18.20	20.18	57.94	14 52 49.26
9	221	136 4 46.4	143.91	0.65	0.005 9134	29.6	30.31	18.19	20.19	57.94	14 48 53.35
10	222	137 2 20.7	143.95	-0.64	0.005 8413	-30.5	30.45	+18.19	20.19	57.95	14 44 57.44
11	223	137 59 56.0	143.99	0.61	0.005 7672	31.3	30.59	18.18	20.19	57.96	14 41 1.53
12	224	138 57 32.2	144.03	0.56	0.005 6911	32.1	30.72	18.17	20.20	57.97	14 37 5.62
13	225	139 55 9.4	144.07	0.48	0.005 6131	32.9	30.86	18.16	20.20	57.98	14 33 9.72
14	226	140 52 47.6	144.11	0.38	0.005 5334	33.6	31.00	18.15	20.21	57.99	14 29 13.81
15	227	141 50 26.7	144.15	-0.27	0.005 4519	-34.3	31.14	+18.14	20.21	57.99	14 25 17.90
16	228	142 48 6.9	144.19	-0.15	0.005 3689	-34.9	31.28	+18.12	20.21	58.00	14 21 21.99

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sider. or Right Ascension.
		h m s	s	° ' "	"	' "	"	m s	s	h :
Aug. 16	Fr	9 40 34.76	9.361	+13 55 22.0	-47.08	15 49.69	8.69	- 4 18.25	+0.495	9 3
17	Sa	9 44 19.15	9.339	13 36 25.5	47.62	15 49.87	8.69	4 6.09	0.518	9 4
18	Su	9 48 3.01	9.317	13 17 16.1	48.15	15 50.06	8.70	3 53.39	0.540	9 4
19	Mo	9 51 46.35	9.295	12 57 54.2	48.67	15 50.25	8.70	3 40.18	0.561	9 4
20	Tu	9 55 29.19	9.275	12 38 20.0	49.18	15 50.44	8.70	3 26.46	0.582	9 5
21	We	9 59 11.54	9.255	+12 18 33.8	-49.67	15 50.64	8.70	- 3 12.26	+0.602	9 5
22	Th	10 2 53.41	9.235	11 58 35.8	50.15	15 50.83	8.70	2 57.58	0.621	9 5
23	Fr	10 6 34.83	9.217	11 38 26.5	50.62	15 51.03	8.70	2 42.44	0.640	10
24	Sa	10 10 15.81	9.199	11 18 6.0	51.08	15 51.23	8.71	2 26.86	0.658	10
25	Su	10 13 56.37	9.182	10 57 34.7	51.52	15 51.43	8.71	2 10.87	0.675	10 1
26	Mo	10 17 36.53	9.165	+10 36 52.9	-51.96	15 51.64	8.71	- 1 54.48	+0.691	10 1
27	Tu	10 21 16.30	9.149	10 16 0.8	52.38	15 51.84	8.71	1 37.70	0.707	10 1
28	We	10 24 55.70	9.134	9 54 58.9	52.78	15 52.05	8.71	1 20.55	0.722	10 2
29	Th	10 28 34.75	9.120	9 33 47.3	53.18	15 52.26	8.72	1 3.05	0.736	10 2
30	Fr	10 32 13.47	9.106	9 12 26.5	53.55	15 52.47	8.72	0 45.21	0.750	10 3
31	Sa	10 35 51.86	9.093	+ 8 50 56.7	-53.92	15 52.69	8.72	- 0 27.04	+0.763	10 3
Sept. 1	Su	10 39 29.95	9.081	8 29 18.4	54.27	15 52.91	8.72	- 0 8.57	0.776	10 3
2	Mo	10 43 7.73	9.069	8 7 31.8	54.61	15 53.13	8.72	+ 0 10.19	0.788	10 4
3	Tu	10 46 45.24	9.057	7 45 37.3	54.93	15 53.35	8.73	0 29.23	0.799	10 4
4	We	10 50 22.49	9.047	7 23 35.3	55.23	15 53.59	8.73	0 48.54	0.810	10 5
5	Th	10 53 59.48	9.036	+ 7 1 26.1	-55.53	15 53.83	8.73	+ 1 8.11	+0.820	10 5
6	Fr	10 57 36.23	9.027	6 39 10.0	55.81	15 54.07	8.73	1 27.91	0.830	10 5
7	Sa	11 1 12.76	9.018	6 16 47.4	56.07	15 54.31	8.73	1 47.93	0.839	11
8	Su	11 4 49.08	9.010	5 54 18.6	56.32	15 54.55	8.74	2 8.16	0.847	11
9	Mo	11 8 25.22	9.002	5 31 44.0	56.56	15 54.80	8.74	2 28.58	0.855	11 1
10	Tu	11 12 1.17	8.995	+ 5 9 3.9	-56.78	15 55.05	8.74	+ 2 43.18	+0.861	11 1
11	We	11 15 36.97	8.989	4 46 18.7	56.99	15 55.31	8.74	3 9.93	0.868	11 1
12	Th	11 19 12.63	8.983	4 23 28.6	57.18	15 55.56	8.75	3 30.82	0.873	11 2
13	Fr	11 22 48.17	8.979	4 0 34.0	57.36	15 55.82	8.75	3 51.84	0.878	11 2
14	Sa	11 26 23.60	8.975	3 37 35.3	57.52	15 56.08	8.75	4 12.96	0.882	11 3
15	Su	11 29 58.95	8.971	+ 3 14 32.8	-57.68	15 56.34	8.75	+ 4 34.17	+0.885	11 3
16	Mo	11 33 34.23	8.969	2 51 26.7	57.82	15 56.61	8.75	4 55.44	0.887	11 3
17	Tu	11 37 9.46	8.968	2 28 17.5	57.94	15 56.88	8.76	5 16.75	0.889	11 4
18	We	11 40 44.68	8.967	2 5 5.4	58.06	15 57.14	8.76	5 38.09	0.889	11 4
19	Th	11 44 19.90	8.968	1 41 50.7	58.16	15 57.40	8.76	5 59.42	0.888	11 5
20	Fr	11 47 55.14	8.969	+ 1 18 33.8	-58.25	15 57.67	8.76	+ 6 20.73	+0.887	11 5
21	Sa	11 51 30.43	8.972	0 55 14.9	58.32	15 57.93	8.77	6 41.99	0.884	11 5
22	Su	11 55 5.81	8.976	0 31 54.4	58.38	15 58.19	8.77	7 3.17	0.881	12
23	Mo	11 58 41.28	8.981	+ 0 8 32.5	58.43	15 58.46	8.77	7 24.26	0.876	12
24	Tu	12 2 16.88	8.986	- 0 14 50.4	58.47	15 58.72	8.77	7 45.21	0.870	12 1
25	We	12 5 52.63	8.993	- 0 38 13.9	-58.49	15 58.99	8.78	+ 8 6.01	+0.863	12 1
26	Th	12 9 28.55	9.001	1 1 37.9	58.50	15 59.25	8.78	8 26.64	0.856	12 1
27	Fr	12 13 4.66	9.009	1 25 1.8	58.49	15 59.52	8.78	8 47.08	0.847	12 2
28	Sa	12 16 40.99	9.019	1 48 25.3	58.47	15 59.79	8.78	9 7.30	0.838	12 2
29	Su	12 20 17.55	9.029	2 11 48.2	58.43	16 0.05	8.79	9 27.29	0.828	12 2
30	Mo	12 23 54.37	9.040	- 2 35 10.0	-58.38	16 0.32	8.79	+ 9 47.03	+0.817	12 3
Oct. 1	Tu	12 27 31.46	9.051	- 2 58 30.3	-58.31	16 0.59	8.79	+10 6.50	+0.805	12 3

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliq-uity.	Mean Time of Sidereal Noon.
		° ' "	"	"			"	"	"	23° 26' "	h m s
Aug. 16	228	142 48 6.9	144.19	-0.15	0.005 3689	-34.9	31.28	+18.12	20.21	58.00	14 21 21.99
17	229	143 45 48.0	144.24	-0.02	0.005 2845	35.4	31.41	18.11	20.22	58.01	14 17 26.08
18	230	144 43 30.2	144.28	+0.12	0.005 1988	35.9	31.55	18.09	20.22	58.02	14 13 30.17
19	231	145 41 13.6	144.33	0.24	0.005 1120	36.4	31.69	18.07	20.22	58.03	14 9 34.26
20	232	146 38 58.1	144.38	0.34	0.005 0242	36.8	31.83	18.05	20.23	58.03	14 5 38.36
21	233	147 36 43.9	144.44	+0.42	0.004 9355	-37.1	31.96	+18.03	20.23	58.04	14 1 42.45
22	234	148 34 31.0	144.49	0.47	0.004 8460	37.5	32.10	18.01	20.24	58.05	13 57 46.54
23	235	149 32 19.6	144.56	0.49	0.004 7557	37.8	32.24	17.98	20.24	58.05	13 53 50.63
24	236	150 30 9.8	144.62	0.48	0.004 6647	38.1	32.38	17.96	20.25	58.06	13 49 54.72
25	237	151 28 1.6	144.70	0.44	0.004 5729	38.5	32.51	17.93	20.25	58.07	13 45 58.82
26	238	152 25 55.2	144.77	+0.37	0.004 4801	-38.9	32.65	+17.90	20.25	58.07	13 42 2.91
27	239	153 23 50.6	144.85	0.28	0.004 3864	39.3	32.79	17.88	20.26	58.08	13 38 7.00
28	240	154 21 47.8	144.93	0.16	0.004 2915	39.8	32.93	17.85	20.26	58.08	13 34 11.09
29	241	155 19 47.0	145.00	+0.03	0.004 1954	40.3	33.06	17.81	20.27	58.09	13 30 15.18
30	242	156 17 48.0	145.08	-0.10	0.004 0980	40.9	33.20	17.78	20.27	58.09	13 26 19.28
31	243	157 15 50.9	145.16	-0.23	0.003 9992	-41.5	33.34	+17.75	20.28	58.10	13 22 23.37
Sept. 1	244	158 13 55.6	145.24	0.35	0.003 8987	42.2	33.48	17.72	20.28	58.10	13 18 27.46
2	245	159 12 2.3	145.31	0.45	0.003 7967	42.8	33.61	17.68	20.29	58.10	13 14 31.56
3	246	160 10 10.7	145.39	0.53	0.003 6931	43.5	33.75	17.64	20.29	58.11	13 10 35.65
4	247	161 8 21.0	145.46	0.58	0.003 5878	44.2	33.89	17.61	20.30	58.11	13 6 39.74
5	248	162 6 33.0	145.54	-0.60	0.003 4809	-44.9	34.03	+17.57	20.30	58.11	13 2 43.83
6	249	163 4 46.7	145.61	0.60	0.003 3724	45.5	34.16	17.53	20.31	58.11	12 58 47.93
7	250	164 3 2.2	145.68	0.58	0.003 2623	46.2	34.30	17.49	20.31	58.11	12 54 52.02
8	251	165 1 19.2	145.75	0.53	0.003 1507	46.8	34.44	17.45	20.32	58.11	12 50 56.11
9	252	165 59 38.0	145.81	0.46	0.003 0378	47.3	34.58	17.41	20.32	58.11	12 47 0.20
10	253	166 57 58.3	145.88	-0.37	0.002 9235	-47.9	34.71	+17.37	20.33	58.11	12 43 4.30
11	254	167 56 20.3	145.95	0.26	0.002 8080	48.4	34.85	17.32	20.33	58.11	12 39 8.39
12	255	168 54 43.8	146.01	0.14	0.002 6914	48.8	34.99	17.28	20.34	58.11	12 35 12.48
13	256	169 53 8.9	146.08	-0.01	0.002 5738	49.2	35.13	17.24	20.34	58.10	12 31 16.58
14	257	170 51 35.6	146.15	+0.11	0.002 4553	49.5	35.26	17.19	20.35	58.10	12 27 20.67
15	258	171 50 3.9	146.21	+0.23	0.002 3362	-49.7	35.40	+17.15	20.35	58.10	12 23 24.76
16	259	172 48 33.8	146.28	0.33	0.002 2166	49.9	35.54	17.10	20.36	58.09	12 19 28.86
17	260	173 47 5.4	146.35	0.42	0.002 0966	50.0	35.68	17.06	20.37	58.09	12 15 32.95
18	261	174 45 38.7	146.42	0.48	0.001 9764	50.1	35.82	17.01	20.37	58.08	12 11 37.04
19	262	175 44 13.7	146.50	0.51	0.001 8562	50.1	35.95	16.96	20.38	58.08	12 7 41.14
20	263	176 42 50.6	146.58	+0.51	0.001 7360	-50.1	36.09	+16.92	20.38	58.07	12 3 45.23
21	264	177 41 29.4	146.66	0.47	0.001 6159	50.0	36.23	16.87	20.39	58.06	11 59 49.32
22	265	178 40 10.2	146.75	0.40	0.001 4959	50.0	36.37	16.82	20.39	58.05	11 55 53.42
23	266	179 38 53.2	146.84	0.30	0.001 3761	49.9	36.50	16.78	20.40	58.04	11 51 57.51
24	267	180 37 38.3	146.93	0.18	0.001 2563	49.9	36.64	16.73	20.41	58.04	11 48 1.60
25	268	181 36 25.7	147.02	+0.05	0.001 1364	-50.0	36.78	+16.68	20.41	58.03	11 44 5.70
26	269	182 35 15.4	147.12	-0.08	0.001 0163	50.1	36.92	16.63	20.42	58.01	11 40 9.79
27	270	183 34 7.4	147.21	0.21	0.000 8960	50.2	37.05	16.59	20.42	58.00	11 36 13.88
28	271	184 33 1.7	147.31	0.33	0.000 7753	50.4	37.19	16.54	20.43	57.99	11 32 17.98
29	272	185 31 58.3	147.41	0.43	0.000 6541	50.6	37.33	16.49	20.43	57.98	11 28 22.07
30	273	186 30 57.2	147.50	-0.52	0.000 5324	-50.8	37.47	+16.45	20.44	57.96	11 24 26.16
Oct. 1	274	187 29 58.3	147.59	-0.58	0.000 4101	-51.1	37.60	+16.40	20.44	57.95	11 20 30.26

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Oct. 1	Tu	12 27 31.46	9.051	— 2 58 30.3	—58.31	16 0.59	8.79	+10 6.50	+0.805	12 37 37.95
2	We	12 31 8.83	9.064	3 21 48.8	58.22	16 0.87	8.79	10 25.67	0.792	12 41 34.51
3	Th	12 34 46.51	9.077	3 45 5.1	58.12	16 1.14	8.80	10 44.54	0.780	12 45 31.06
4	Fr	12 38 24.52	9.091	4 8 18.8	58.01	16 1.41	8.80	11 3.09	0.766	12 49 27.61
5	Sa	12 42 2.87	9.105	4 31 29.6	57.88	16 1.69	8.80	11 21.30	0.751	12 53 24.16
6	Su	12 45 41.57	9.120	— 4 54 37.0	—57.73	16 1.97	8.80	+11 39.15	+0.736	12 57 20.72
7	Mo	12 49 20.65	9.136	5 17 40.8	57.57	16 2.25	8.81	11 56.62	0.720	13 1 17.27
8	Tu	12 53 0.12	9.153	5 40 40.4	57.39	16 2.53	8.81	12 13.70	0.703	13 5 13.82
9	We	12 56 40.00	9.171	6 3 35.6	57.20	16 2.81	8.81	12 30.37	0.686	13 9 10.37
10	Th	13 0 20.31	9.189	6 26 26.0	56.99	16 3.09	8.81	12 46.62	0.668	13 13 6.93
11	Fr	13 4 1.06	9.207	— 6 49 11.1	—56.76	16 3.37	8.82	+13 2.42	+0.649	13 17 3.48
12	Sa	13 7 42.26	9.227	7 11 50.7	56.52	16 3.65	8.82	13 17.77	0.630	13 21 0.03
13	Su	13 11 23.95	9.247	7 34 24.3	56.27	16 3.93	8.82	13 32.64	0.609	13 24 56.59
14	Mo	13 15 6.13	9.268	7 56 51.5	55.99	16 4.22	8.82	13 47.01	0.588	13 28 53.14
15	Tu	13 18 48.82	9.290	8 19 12.0	55.71	16 4.49	8.83	14 0.87	0.566	13 32 49.63
16	We	13 22 32.04	9.312	— 8 41 25.5	—55.41	16 4.77	8.83	+14 14.20	+0.544	13 36 46.25
17	Th	13 26 15.82	9.336	9 3 31.5	55.09	16 5.05	8.83	14 26.98	0.521	13 40 42.80
18	Fr	13 30 0.17	9.360	9 25 23.7	54.76	16 5.33	8.83	14 39.19	0.496	13 44 39.35
19	Sa	13 33 45.11	9.385	9 47 19.7	54.41	16 5.60	8.84	14 50.80	0.471	13 48 35.91
20	Su	13 37 30.66	9.411	10 9 1.2	54.04	16 5.87	8.84	15 1.80	0.445	13 52 32.46
21	Mo	13 41 16.85	9.439	—10 30 33.8	—53.67	16 6.14	8.84	+15 12.16	+0.418	13 56 29.01
22	Tu	13 45 3.71	9.466	10 51 57.2	53.27	16 6.40	8.84	15 21.86	0.390	14 0 25.57
23	We	13 48 51.24	9.495	11 13 10.9	52.86	16 6.67	8.85	15 30.88	0.361	14 4 22.12
24	Th	13 52 39.47	9.524	11 34 14.5	52.44	16 6.93	8.85	15 39.21	0.332	14 8 18.67
25	Fr	13 56 28.41	9.554	11 55 7.8	51.99	16 7.18	8.85	15 46.82	0.302	14 12 15.23
26	Sa	14 0 18.08	9.585	—12 15 50.2	—51.53	16 7.44	8.85	+15 53.70	+0.271	14 16 11.78
27	Su	14 4 8.50	9.616	12 36 21.4	51.06	16 7.70	8.86	15 59.84	0.240	14 20 8.33
28	Mo	14 7 59.67	9.648	12 56 41.0	50.56	16 7.95	8.86	16 5.22	0.208	14 24 4.89
29	Tu	14 11 51.61	9.680	13 16 48.5	50.05	16 8.20	8.86	16 9.83	0.176	14 28 1.44
30	We	14 15 44.33	9.713	13 36 43.5	49.52	16 8.45	8.86	16 13.67	0.144	14 31 58.00
31	Th	14 19 37.83	9.746	—13 56 25.7	—48.96	16 8.70	8.87	+16 16.72	+0.111	14 35 54.55
Nov. 1	Fr	14 23 32.13	9.779	14 15 54.5	48.41	16 8.95	8.87	16 18.98	0.077	14 39 51.11
2	Sa	14 27 27.23	9.813	14 35 9.5	47.83	16 9.20	8.87	16 20.43	0.044	14 43 47.66
3	Su	14 31 23.14	9.846	14 54 10.5	47.24	16 9.44	8.87	16 21.08	+0.010	14 47 44.21
4	Mo	14 35 19.86	9.880	15 12 56.8	46.62	16 9.69	8.87	16 20.91	—0.024	14 51 40.77
5	Tu	14 39 17.40	9.915	—15 31 28.2	—45.99	16 9.94	8.88	+16 19.93	—0.058	14 55 37.32
6	We	14 43 15.76	9.949	15 49 44.2	45.34	16 10.18	8.88	16 18.12	0.092	14 59 33.68
7	Th	14 47 14.94	9.983	16 7 44.3	44.67	16 10.42	8.88	16 15.49	0.127	15 3 30.43
8	Fr	14 51 14.95	10.018	16 25 28.2	43.98	16 10.66	8.88	16 12.03	0.161	15 7 26.99
9	Sa	14 55 15.79	10.052	16 42 55.4	43.28	16 10.90	8.89	16 7.75	0.196	15 11 23.55
10	Su	14 59 17.46	10.087	—17 0 5.6	—42.56	16 11.14	8.89	+16 2.64	—0.230	15 15 20.10
11	Mo	15 3 19.95	10.121	17 16 58.4	41.83	16 11.37	8.89	15 56.70	0.265	15 19 16.66
12	Tu	15 7 23.27	10.156	17 33 33.3	41.08	16 11.61	8.89	15 49.94	0.299	15 23 13.21
13	We	15 11 27.42	10.190	17 49 50.0	40.31	16 11.83	8.89	15 42.35	0.334	15 27 9.77
14	Th	15 15 32.40	10.225	18 5 48.0	39.52	16 12.06	8.90	15 33.92	0.368	15 31 6.32
15	Fr	15 19 38.21	10.259	—18 21 27.1	—38.72	16 12.28	8.90	+15 24.67	—0.403	15 35 2.88
16	Sa	15 23 44.84	10.294	—18 36 46.8	—37.91	16 12.50	8.90	+15 14.59	—0.437	15 38 59.43

SUN, 1918.

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FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Nov. 16	Sa	15 23 44.84	10.294	−18 36 46.8	−37.91	16 12.50	8.90	+15 14.59	−0.437	15 38 59.43
17	Su	15 27 52.31	10.329	18 51 46.7	37.08	16 12.71	8.90	15 3.68	0.472	15 42 55.99
18	Mo	15 32 0.61	10.363	19 6 26.4	36.23	16 12.91	8.90	14 51.93	0.507	15 46 52.55
19	Tu	15 36 9.75	10.398	19 20 45.7	35.37	16 13.12	8.91	14 39.36	0.541	15 50 49.10
20	We	15 40 19.71	10.432	19 34 44.1	34.49	16 13.31	8.91	14 25.95	0.576	15 54 45.66
21	Th	15 44 30.50	10.467	−19 48 21.3	−33.60	16 13.51	8.91	+14 11.72	−0.610	15 58 42.22
22	Fr	15 48 42.11	10.501	20 1 36.9	32.69	16 13.69	8.91	13 56.66	0.645	16 2 38.77
23	Sa	15 52 54.54	10.535	20 14 30.6	31.77	16 13.88	8.91	13 40.78	0.678	16 6 35.33
24	Su	15 57 7.78	10.568	20 27 2.0	30.83	16 14.06	8.91	13 24.10	0.711	16 10 31.89
25	Mo	16 1 21.81	10.601	20 39 10.6	29.88	16 14.23	8.92	13 6.63	0.744	16 14 28.44
26	Tu	16 5 36.62	10.633	−20 50 56.3	−28.92	16 14.40	8.92	+12 48.38	−0.776	16 18 25.00
27	We	16 9 52.19	10.665	21 2 18.7	27.94	16 14.57	8.92	12 29.36	0.808	16 22 21.56
28	Th	16 14 8.52	10.695	21 13 17.3	26.94	16 14.73	8.92	12 9.60	0.839	16 26 18.11
29	Fr	16 18 25.57	10.725	21 23 51.9	25.94	16 14.90	8.92	11 49.10	0.869	16 30 14.67
30	Sa	16 22 43.33	10.754	21 34 2.2	24.91	16 15.05	8.92	11 27.90	0.898	16 34 11.23
Dec. 1	Su	16 27 1.77	10.782	−21 43 47.8	−23.88	16 15.21	8.93	+11 6.01	−0.926	16 38 7.78
2	Mo	16 31 20.89	10.810	21 53 8.6	22.84	16 15.37	8.93	10 43.45	0.954	16 42 4.34
3	Tu	16 35 40.64	10.836	22 2 4.0	21.78	16 15.52	8.93	10 20.26	0.979	16 46 0.90
4	We	16 40 1.00	10.861	22 10 34.0	20.71	16 15.66	8.93	9 56.46	1.004	16 49 57.46
5	Th	16 44 21.95	10.885	22 18 38.3	19.64	16 15.81	8.93	9 32.07	1.028	16 53 54.01
6	Fr	16 48 43.46	10.907	−22 26 16.5	−18.54	16 15.95	8.93	+ 9 7.12	−1.051	16 57 50.57
7	Sa	16 53 5.49	10.928	22 33 28.4	17.45	16 16.08	8.93	8 41.64	1.072	17 1 47.13
8	Su	16 57 28.02	10.948	22 40 13.9	16.34	16 16.22	8.93	8 15.67	1.092	17 5 43.69
9	Mo	17 1 51.01	10.967	22 46 32.8	15.22	16 16.34	8.94	7 49.23	1.111	17 9 40.24
10	Tu	17 6 14.44	10.985	22 52 24.7	14.10	16 16.47	8.94	7 22.36	1.128	17 13 36.80
11	We	17 10 38.28	11.001	−22 57 49.6	−12.97	16 16.59	8.94	+ 6 55.08	−1.145	17 17 33.36
12	Th	17 15 2.49	11.016	23 2 47.2	11.83	16 16.70	8.94	6 27.42	1.160	17 21 29.92
13	Fr	17 19 27.05	11.030	23 7 17.4	10.69	16 16.81	8.94	5 59.42	1.173	17 25 26.48
14	Sa	17 23 51.92	11.042	23 11 20.1	9.54	16 16.92	8.94	5 31.11	1.186	17 29 23.03
15	Su	17 28 17.09	11.054	23 14 55.1	8.38	16 17.02	8.94	5 2.51	1.197	17 33 19.59
16	Mo	17 32 42.51	11.064	−23 18 2.3	− 7.22	16 17.11	8.94	+ 4 33.64	−1.208	17 37 16.15
17	Tu	17 37 8.16	11.073	23 20 41.6	6.05	16 17.20	8.94	4 4.55	1.216	17 41 12.71
18	We	17 41 34.02	11.081	23 22 52.8	4.88	16 17.28	8.94	3 35.25	1.225	17 45 9.27
19	Th	17 46 0.05	11.088	23 24 36.0	3.71	16 17.35	8.94	3 5.77	1.231	17 49 5.82
20	Fr	17 50 26.24	11.094	23 25 51.1	2.54	16 17.42	8.95	2 36.14	1.237	17 53 2.38
21	Sa	17 54 52.54	11.098	−23 26 37.9	− 1.36	16 17.48	8.95	+ 2 6.40	−1.241	17 56 58.94
22	Su	17 59 18.93	11.101	23 26 56.4	− 0.18	16 17.54	8.95	1 36.57	1.244	18 0 55.50
23	Mo	18 3 45.37	11.102	23 26 46.6	+ 1.00	16 17.59	8.95	1 6.68	1.246	18 4 52.06
24	Tu	18 8 11.84	11.102	23 26 8.6	2.18	16 17.63	8.95	0 36.78	1.246	18 8 48.61
25	We	18 12 38.29	11.101	23 25 2.2	3.35	16 17.67	8.95	+ 0 6.88	1.245	18 12 45.17
26	Th	18 17 4.69	11.099	−23 23 27.6	+ 4.53	16 17.71	8.95	− 0 22.97	−1.242	18 16 41.73
27	Fr	18 21 31.02	11.094	23 21 24.7	5.71	16 17.74	8.95	0 52.73	1.238	18 20 38.29
28	Sa	18 25 57.22	11.089	23 18 53.6	6.88	16 17.76	8.95	1 22.38	1.232	18 24 34.85
29	Su	18 30 23.27	11.082	23 15 54.4	8.05	16 17.78	8.95	1 51.87	1.225	18 28 31.40
30	Mo	18 34 49.14	11.073	23 12 27.2	9.21	16 17.80	8.95	2 21.18	1.217	18 32 27.96
31	Tu	18 39 14.78	11.063	−23 8 32.1	+10.38	16 17.81	8.95	− 2 50.27	−1.208	18 36 24.52
32	We	18 43 40.17	11.052	−23 4 9.2	+11.53	16 17.82	8.95	− 3 19.09	−1.195	18 40 21.08

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.			Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliq-uity.	Mean Time of Sidereal Noon.
		°	'	"	"	"			"	"	"	23° 28'	h m s
Nov. 16	320	233	20	6.0	151.16	+0.31	9.995 0604	-39.9	43.93	+15.36	20.70	56.82	8 19 38.49
17	321	234	20	34.6	151.22	0.20	9.994 9658	39.0	44.07	15.37	20.70	56.79	8 15 42.58
18	322	235	21	4.8	151.29	+0.07	9.994 8734	38.1	44.21	15.38	20.71	56.76	8 11 46.67
19	323	236	21	36.4	151.36	-0.07	9.994 7831	37.2	44.35	15.39	20.71	56.73	8 7 50.76
20	324	237	22	9.7	151.42	0.21	9.994 6950	36.2	44.48	15.41	20.72	56.70	8 3 54.85
21	325	238	22	44.6	151.49	-0.34	9.994 6092	-35.3	44.62	+15.43	20.72	56.68	7 59 58.94
22	326	239	23	21.2	151.56	0.46	9.994 5254	34.5	44.76	15.45	20.72	56.65	7 56 3.03
23	327	240	23	59.4	151.63	0.56	9.994 4435	33.7	44.90	15.47	20.73	56.62	7 52 7.11
24	328	241	24	39.3	151.70	0.63	9.994 3636	32.9	45.03	15.49	20.73	56.59	7 48 11.20
25	329	242	25	20.9	151.77	0.68	9.994 2855	32.2	45.17	15.51	20.74	56.57	7 44 15.29
26	330	243	26	4.1	151.83	-0.70	9.994 2091	-31.5	45.31	+15.53	20.74	56.54	7 40 19.38
27	331	244	26	48.9	151.90	0.69	9.994 1343	30.9	45.45	15.56	20.74	56.51	7 36 23.47
28	332	245	27	35.2	151.96	0.64	9.994 0610	30.2	45.58	15.59	20.75	56.48	7 32 27.56
29	333	246	28	23.0	152.02	0.57	9.993 9892	29.6	45.72	15.61	20.75	56.46	7 28 31.65
30	334	247	29	12.1	152.08	0.48	9.993 9190	29.0	45.86	15.64	20.75	56.44	7 24 35.74
Dec. 1	335	248	30	2.7	152.13	-0.38	9.993 8501	-28.4	46.00	+15.67	20.76	56.42	7 20 39.83
2	336	249	30	54.5	152.18	0.26	9.993 7825	27.9	46.13	15.70	20.76	56.40	7 16 43.92
3	337	250	31	47.5	152.23	-0.13	9.993 7164	27.3	46.27	15.74	20.76	56.38	7 12 48.00
4	338	251	32	41.7	152.28	0.00	9.993 6515	26.7	46.41	15.77	20.77	56.35	7 8 52.09
5	339	252	33	36.8	152.32	+0.13	9.993 5881	26.1	46.55	15.80	20.77	56.33	7 4 56.18
6	340	253	34	32.9	152.36	+0.25	9.993 5260	-25.6	46.68	+15.84	20.77	56.31	7 1 0.27
7	341	254	35	29.3	152.39	0.35	9.993 4654	24.9	46.82	15.88	20.77	56.29	6 57 4.36
8	342	255	36	27.6	152.42	0.43	9.993 4064	24.2	46.96	15.91	20.78	56.27	6 53 8.45
9	343	256	37	26.0	152.45	0.48	9.993 3491	23.5	47.10	15.95	20.78	56.25	6 49 12.53
10	344	257	38	25.0	152.47	0.50	9.993 2936	22.7	47.23	15.99	20.78	56.23	6 45 16.62
11	345	258	39	24.6	152.49	+0.49	9.993 2400	-21.9	47.37	+16.03	20.79	56.22	6 41 20.71
12	346	259	40	24.7	152.51	0.44	9.993 1886	20.9	47.51	16.07	20.79	56.20	6 37 24.80
13	347	260	41	25.3	152.54	0.36	9.993 1395	20.0	47.65	16.11	20.79	56.18	6 33 28.89
14	348	261	42	26.4	152.56	0.26	9.993 0928	18.9	47.78	16.15	20.79	56.17	6 29 32.97
15	349	262	43	28.0	152.58	+0.13	9.993 0488	17.8	47.92	16.19	20.79	56.15	6 25 37.06
16	350	263	44	30.1	152.60	-0.01	9.993 0074	-16.6	48.06	+16.24	20.80	56.14	6 21 41.15
17	351	264	45	32.7	152.62	0.15	9.992 9689	15.5	48.20	16.28	20.80	56.12	6 17 45.24
18	352	265	46	36.0	152.65	0.29	9.992 9331	14.3	48.33	16.32	20.80	56.11	6 13 49.33
19	353	266	47	39.9	152.67	0.42	9.992 9002	13.1	48.47	16.36	20.80	56.10	6 9 53.41
20	354	267	48	44.4	152.70	0.52	9.992 8701	12.0	48.61	16.41	20.80	56.09	6 5 57.50
21	355	268	49	49.7	152.73	-0.60	9.992 8426	-10.9	48.75	+16.45	20.80	56.07	6 2 1.59
22	356	269	50	55.6	152.76	0.65	9.992 8178	9.8	48.89	16.49	20.81	56.06	5 58 5.68
23	357	270	52	2.3	152.79	0.68	9.992 7955	8.8	49.02	16.54	20.81	56.05	5 54 9.77
24	358	271	53	9.6	152.82	0.68	9.992 7756	7.8	49.16	16.58	20.81	56.05	5 50 13.85
25	359	272	54	17.5	152.84	0.64	9.992 7580	6.9	49.30	16.63	20.81	56.04	5 46 17.94
26	360	273	55	26.0	152.87	-0.58	9.992 7426	- 6.0	49.44	+16.67	20.81	56.03	5 42 22.03
27	361	274	56	35.1	152.89	0.51	9.992 7293	5.1	49.57	16.71	20.81	56.03	5 38 26.12
28	362	275	57	44.6	152.91	0.41	9.992 7180	4.3	49.71	16.75	20.81	56.02	5 34 30.21
29	363	276	58	54.6	152.92	0.29	9.992 7088	3.5	49.85	16.79	20.81	56.01	5 30 34.29
30	364	278	0	4.9	152.94	0.17	9.992 7013	2.7	49.99	16.84	20.81	56.01	5 26 38.38
31	365	279	1	15.6	152.95	-0.04	9.992 6957	- 2.0	50.12	+16.88	20.81	56.00	5 22 42.47
32	366	280	2	26.4	152.95	+0.09	9.992 6918	- 1.3	50.26	+16.92	20.81	56.00	5 18 46.56

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1918.0.	Y		Reduc. to Mean Eq'x of 1918.0.	Z		Red. to Mean Eq'x of 1918.0.
	True Equinox.	True Equinox.		True Equinox.	True Equinox.		True Equinox.	True Equinox.	
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	No
Jan. 1	+0.175 6146	+0.184 2114	-831	-0.887 5389	-0.886 0710	-133	-0.384 9935	-0.384 3570	-
2	0.192 7942	0.201 3623	837	0.884 5343	0.882 9290	148	0.383 6906	0.382 9944	
3	0.209 9149	0.218 4516	842	0.881 2551	0.879 5126	164	0.382 2683	0.381 5124	
4	0.226 9717	0.235 4746	847	0.877 7016	0.875 8224	179	0.380 7268	0.379 9116	
5	0.243 9596	0.252 4259	852	0.873 8750	0.871 8595	195	0.379 0668	0.378 1925	
6	+0.260 8728	+0.269 2998	-856	-0.869 7761	-0.867 6249	-211	-0.377 2886	-0.376 3553	-1
7	0.277 7062	0.286 0913	860	0.865 4060	0.863 1195	227	0.375 3926	0.374 4005	1
8	0.294 4544	0.302 7948	863	0.860 7656	0.858 3444	243	0.373 3792	0.372 3287	1
9	0.311 1119	0.319 4050	866	0.855 8562	0.853 3010	260	0.371 2490	0.370 1403	1
10	0.327 6733	0.335 9162	869	0.850 6791	0.847 9907	277	0.369 0026	0.367 8361	1
11	+0.344 1331	+0.352 3232	-871	-0.845 2360	-0.842 4151	-294	-0.366 6409	-0.365 4169	-1
12	0.360 4858	0.368 6202	873	0.839 5283	0.836 5757	311	0.364 1643	0.362 8832	1
13	0.376 7258	0.384 8018	874	0.833 5576	0.830 4744	328	0.361 5737	0.360 2360	1
14	0.392 8477	0.400 8627	875	0.827 3265	0.824 1139	345	0.358 8702	0.357 4764	1
15	0.408 8462	0.416 7976	876	0.820 8870	0.817 4961	363	0.356 0548	0.354 6055	1
16	+0.424 7161	+0.432 6011	-876	-0.814 0915	-0.810 6234	-380	-0.353 1285	-0.351 6240	-1
17	0.440 4521	0.448 2684	876	0.807 0922	0.803 4984	398	0.350 0922	0.348 5332	1
18	0.456 0495	0.463 7948	875	0.799 8422	0.796 1239	416	0.346 9473	0.345 3345	1
19	0.471 5036	0.479 1754	874	0.792 3439	0.788 5025	434	0.343 6950	0.342 0290	1
20	0.486 8096	0.494 4057	872	0.784 6001	0.780 6370	452	0.340 3365	0.338 6176	2
21	+0.501 9631	+0.509 4814	-870	-0.776 6136	-0.772 5303	-470	-0.336 8726	-0.335 1016	-2
22	0.516 9599	0.524 3980	867	0.768 3873	0.764 1850	488	0.333 3048	0.331 4824	2
23	0.531 7954	0.539 1515	864	0.759 9239	0.755 6043	506	0.329 6344	0.327 7610	2
24	0.546 4657	0.553 7376	860	0.751 2264	0.746 7905	524	0.325 8623	0.323 9385	2
25	0.560 9666	0.568 1521	856	0.742 2971	0.737 7464	542	0.321 9897	0.320 0160	2
26	+0.575 2938	+0.582 3911	-852	-0.733 1389	-0.728 4749	-560	-0.318 0177	-0.315 9949	-2
27	0.589 4436	0.596 4507	847	0.723 7548	0.718 9790	579	0.313 9478	0.311 8765	2
28	0.603 4118	0.610 3265	841	0.714 1478	0.709 2614	597	0.309 7810	0.307 6615	2
29	0.617 1943	0.624 0145	835	0.704 3202	0.699 3246	615	0.305 5183	0.303 3515	2
30	0.630 7868	0.637 5107	829	0.694 2750	0.689 1719	633	0.301 1613	0.298 9477	2
31	+0.644 1857	+0.650 8112	-822	-0.684 0156	-0.678 8064	-651	-0.296 7110	-0.294 4514	-2
Feb. 1	0.657 3868	0.663 9119	815	0.673 5446	0.668 2307	669	0.292 1690	0.289 8640	2
2	0.670 3861	0.676 8087	807	0.662 8651	0.657 4481	686	0.287 5364	0.285 1865	3
3	0.683 1794	0.689 4976	799	0.651 9802	0.646 4618	704	0.282 8145	0.280 4205	3
4	0.695 7629	0.701 9749	790	0.640 8933	0.635 2751	721	0.278 0048	0.275 5675	3
5	+0.708 1329	+0.714 2364	-781	-0.629 6075	-0.623 8911	-739	-0.273 1088	-0.270 6289	-3
6	0.720 2850	0.726 2781	771	0.618 1262	0.612 3132	756	0.268 1279	0.265 6061	3
7	0.732 2153	0.738 0962	761	0.606 4527	0.600 5450	773	0.263 0636	0.260 5007	3
8	0.743 9202	0.749 6868	750	0.594 5907	0.588 5902	790	0.257 9175	0.255 3143	3
9	0.755 3955	0.761 0459	739	0.582 5440	0.576 4526	807	0.252 6913	0.250 0487	3
10	+0.766 6374	+0.772 1696	-727	-0.570 3164	-0.564 1361	-823	-0.247 3867	-0.244 7056	-3
11	0.777 6421	0.783 0545	715	0.557 9120	0.551 6447	840	0.242 0055	0.239 2867	3
12	0.788 4064	0.793 6972	703	0.545 3348	0.538 9827	856	0.236 5494	0.233 7940	3
13	0.798 9265	0.804 0939	690	0.532 5891	0.526 1546	872	0.231 0206	0.228 2295	3
14	0.809 1991	0.814 2418	677	0.519 6797	0.513 1650	887	0.225 4209	0.222 5951	3
15	+0.819 2215	+0.824 1379	-663	-0.506 6110	-0.500 0183	-903	-0.219 7522	-0.216 8926	-3
16	+0.828 9908	+0.833 7798	-649	-0.493 3874	-0.486 7188	-918	-0.214 0165	-0.211 1240	-3

SUN, 1918.

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GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1918.0.	Y		Reduc. to Mean Eq'x of 1918.0.	Z		Reduc. to Mean Eq'x of 1918.0.
	True Equinox.	True Equinox.		True Equinox.	True Equinox.		True Equinox.	True Equinox.	
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
Feb. 16	+0.828 9908	+0.833 7798	—649	—0.493 3874	—0.486 7188	— 918	—0.214 0165	—0.211 1240	—396
17	0.838 5045	0.843 1647	635	0.480 0132	0.473 2712	933	0.208 2155	0.205 2912	403
18	0.847 7600	0.852 2902	620	0.466 4932	0.459 6798	948	0.202 3514	0.199 3963	409
19	0.856 7551	0.861 1543	605	0.452 8315	0.445 9490	963	0.196 4261	0.193 4409	415
20	0.865 4875	0.869 7546	589	0.439 0327	0.432 0833	977	0.190 4411	0.187 4270	421
21	+0.873 9554	+0.878 0894	—573	—0.425 1012	—0.418 0869	— 991	—0.184 3987	—0.181 3564	—427
22	0.882 1564	0.886 1560	556	0.411 0410	0.403 9640	1005	0.178 3004	0.175 2309	433
23	0.890 0882	0.893 9527	539	0.396 8565	0.389 7190	1019	0.172 1481	0.169 0523	439
24	0.897 7494	0.901 4779	522	0.382 5520	0.375 3561	1032	0.165 9437	0.162 8225	445
25	0.905 1379	0.908 7292	505	0.368 1318	0.360 8795	1045	0.159 6890	0.156 5433	451
26	+0.912 2517	+0.915 7050	—487	—0.353 5999	—0.346 2934	—1057	—0.153 3857	—0.150 2164	—456
27	0.919 0889	0.922 4032	469	0.338 9607	0.331 6023	1069	0.147 0356	0.143 8437	461
28	0.925 6477	0.928 8221	450	0.324 2186	0.316 8102	1081	0.140 6409	0.137 4273	466
Mar. 1	0.931 9262	0.934 9598	431	0.309 3776	0.301 9214	1093	0.134 2031	0.130 9687	471
2	0.937 9228	0.940 8150	412	0.294 4422	0.286 9405	1104	0.127 7242	0.124 4700	476
3	+0.943 6361	+0.946 3858	—392	—0.279 4168	—0.271 8716	—1115	—0.121 2062	—0.117 9330	—481
4	0.949 0640	0.951 6704	372	0.264 3055	0.256 7191	1126	0.114 6507	0.111 3596	486
5	0.954 2048	0.956 6671	352	0.249 1130	0.241 4876	1136	0.108 0600	0.104 7520	491
6	0.959 0570	0.961 3744	332	0.233 8436	0.226 1816	1146	0.101 4359	0.098 1119	495
7	0.963 6191	0.965 7909	311	0.218 5020	0.210 8055	1156	0.094 7804	0.091 4415	500
8	+0.967 8896	+0.969 9150	—290	—0.203 0926	—0.195 3640	—1165	—0.088 0956	—0.084 7428	—504
9	0.971 8669	0.973 7452	269	0.187 6203	0.179 8621	1174	0.081 3835	0.078 0179	508
10	0.975 5496	0.977 2801	247	0.172 0899	0.164 3045	1183	0.074 6463	0.071 2690	512
11	0.978 9364	0.980 5185	226	0.156 5064	0.148 6963	1191	0.067 8862	0.064 4982	516
12	0.982 0262	0.983 4596	204	0.140 8748	0.133 0425	1199	0.061 1054	0.057 7080	519
13	+0.984 8184	+0.986 1025	—182	—0.125 2002	—0.117 3485	—1207	—0.054 3062	—0.050 9003	—523
14	0.987 3120	0.988 4467	160	0.109 4880	0.101 6194	1214	0.047 4907	0.044 0776	526
15	0.989 5068	0.990 4923	138	0.093 7433	0.085 8603	1221	0.040 6613	0.037 2421	529
16	0.991 4030	0.992 2389	115	0.077 9711	0.070 0764	1227	0.033 8202	0.030 3960	532
17	0.993 0000	0.993 6863	92	0.062 1767	0.054 2727	1233	0.026 9696	0.023 5414	535
18	+0.994 2979	+0.994 8349	— 69	—0.046 3650	—0.038 4542	—1239	—0.020 1116	—0.016 6805	—537
19	0.995 2973	0.995 6850	46	0.030 5409	0.022 6257	1244	0.013 2482	0.009 8151	540
20	0.995 9982	0.996 2370	— 22	—0.014 7091	—0.006 7918	1249	—0.006 3814	—0.002 9474	542
21	0.996 4014	0.996 4914	+ 2	+0.001 1257	+0.009 0428	1254	+0.000 4866	+0.003 9205	544
22	0.996 5070	0.996 4485	26	0.016 9588	0.024 8733	1258	0.007 3540	0.010 7868	546
23	+0.996 3158	+0.996 1089	+ 50	+0.032 7856	+0.040 6953	—1262	+0.014 2188	+0.017 6497	—548
24	0.995 8280	0.995 4731	74	0.048 6017	0.056 5043	1265	0.021 0791	0.024 5069	550
25	0.995 0443	0.994 5416	98	0.064 4026	0.072 2959	1268	0.027 9328	0.031 3567	551
26	0.993 9652	0.993 3152	122	0.080 1838	0.088 0656	1271	0.034 7782	0.038 1971	552
27	0.992 5916	0.991 7946	146	0.095 9409	0.103 8090	1273	0.041 6132	0.045 0263	553
28	+0.990 9241	+0.989 9803	+171	+0.111 6695	+0.119 5217	—1275	+0.048 4360	+0.051 8422	—554
29	0.988 9632	0.987 8730	195	0.127 3652	0.135 1993	1277	0.055 2446	0.058 6431	555
30	0.986 7098	0.985 4737	220	0.143 0236	0.150 8375	1278	0.062 0373	0.065 4270	555
31	0.984 1648	0.982 7830	245	0.158 6404	0.166 4319	1279	0.068 8119	0.072 1919	556
Apr. 1	0.981 3286	0.979 8017	270	0.174 2113	0.181 9782	1280	0.075 5667	0.078 9360	556
2	+0.978 2025	+0.976 5309	+295	+0.189 7319	+0.197 4719	—1280	+0.082 2997	+0.085 6574	—556
3	+0.974 7871	+0.972 9712	+320	+0.205 1977	+0.212 9087	—1280	+0.089 0090	+0.092 3542	—555

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1918.0.	Y		Reduc. to Mean Eq'x of 1918.0.	Z		Reduc. to Mean Eq'x of 1918.0.
	True Equinox.			True Equinox.			True Equinox.		
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Apr. 1	+0.981 3286	+0.979 8017	+ 270	+0.174 2113	+0.181 9782	-1280	+0.075 5667	+0.078 9360	-556
2	0.978 2025	0.976 5309	295	0.189 7319	0.197 4719	1280	0.082 2997	0.085 6574	556
3	0.974 7871	0.972 9712	320	0.205 1977	0.212 9087	1280	0.089 0090	0.092 3542	555
4	0.971 0833	0.969 1235	345	0.220 6043	0.228 2840	1280	0.095 6927	0.099 0242	555
5	0.967 0920	0.964 9889	371	0.235 9472	0.243 5934	1279	0.102 3486	0.105 6655	554
6	+0.962 8144	+0.960 5685	+ 396	+0.251 2219	+0.258 8322	-1278	+0.108 9748	+0.112 2761	-553
7	0.958 2515	0.955 8636	421	0.266 4238	0.273 9960	1276	0.115 5693	0.118 8541	552
8	0.953 4049	0.950 8754	446	0.281 5483	0.289 0800	1274	0.122 1301	0.125 3971	551
9	0.948 2755	0.945 6053	472	0.296 5904	0.304 0790	1271	0.128 6549	0.131 9032	550
10	0.942 8650	0.940 0551	497	0.311 5453	0.318 9886	1268	0.135 1418	0.138 3704	548
11	+0.937 1758	+0.934 2272	+ 523	+0.326 4084	+0.333 8041	-1265	+0.141 5888	+0.144 7967	-546
12	0.931 2095	0.928 1231	548	0.341 1751	0.348 5208	1262	0.147 9937	0.151 1797	544
13	0.924 9683	0.921 7455	574	0.355 8406	0.363 1340	1258	0.154 3545	0.157 5178	542
14	0.918 4549	0.915 0968	600	0.370 4005	0.377 6394	1254	0.160 6694	0.163 8091	540
15	0.911 6715	0.908 1795	626	0.384 8503	0.392 0325	1249	0.166 9366	0.170 0518	537
16	+0.904 6210	+0.900 9965	+ 652	+0.399 1857	+0.406 3094	-1244	+0.173 1543	+0.176 2440	-534
17	0.897 3063	0.893 5506	677	0.413 4030	0.420 4661	1239	0.179 3206	0.182 3840	531
18	0.889 7298	0.885 8443	703	0.427 4981	0.434 4986	1233	0.185 4340	0.188 4702	528
19	0.881 8943	0.877 8802	728	0.441 4670	0.448 4029	1227	0.191 4926	0.194 5009	524
20	0.873 8022	0.869 6608	754	0.455 3060	0.462 1757	1220	0.197 4950	0.200 4747	520
21	+0.865 4564	+0.861 1894	+ 779	+0.469 0116	+0.475 8131	-1213	+0.203 4398	+0.206 3900	-516
22	0.856 8600	0.852 4686	804	0.482 5798	0.489 3114	1206	0.209 3251	0.212 2450	512
23	0.848 0155	0.843 5012	830	0.496 0074	0.502 6673	1198	0.215 1495	0.218 0384	507
24	0.838 9260	0.834 2900	855	0.509 2906	0.515 8769	1190	0.220 9114	0.223 7685	503
25	0.829 5938	0.824 8377	880	0.522 4259	0.528 9371	1182	0.226 6094	0.229 4339	498
26	+0.820 0221	+0.815 1472	+ 905	+0.535 4100	+0.541 8443	-1173	+0.232 2418	+0.235 0331	-493
27	0.810 2135	0.805 2213	931	0.548 2396	0.554 5954	1164	0.237 8074	0.240 5646	488
28	0.800 1709	0.795 0628	956	0.560 9112	0.567 1868	1155	0.243 3045	0.246 0268	483
29	0.789 8973	0.784 6747	981	0.573 4216	0.579 6152	1145	0.248 7315	0.251 4184	477
30	0.779 3954	0.774 0597	1006	0.585 7673	0.591 8774	1135	0.254 0873	0.256 7381	471
May 1	+0.768 6679	+0.763 2205	+1031	+0.597 9451	+0.603 9699	-1124	+0.259 3704	+0.261 9841	-465
2	0.757 7179	0.752 1605	1056	0.609 9514	0.615 8892	1113	0.264 5790	0.267 1549	459
3	0.746 5486	0.740 8824	1081	0.621 7829	0.627 6321	1101	0.269 7116	0.272 2490	453
4	0.735 1625	0.729 3892	1106	0.633 4364	0.639 1952	1089	0.274 7668	0.277 2649	446
5	0.723 5630	0.717 6843	1130	0.644 9082	0.650 5749	1077	0.279 7430	0.282 2011	439
6	+0.711 7534	+0.705 7709	+1155	+0.656 1948	+0.661 7675	-1064	+0.284 6388	+0.287 0560	-432
7	0.699 7371	0.693 6525	1179	0.667 2927	0.672 7699	1051	0.289 4526	0.291 8283	425
8	0.687 5175	0.681 3325	1203	0.678 1987	0.683 5787	1037	0.294 1829	0.296 5163	418
9	0.675 0981	0.668 8149	1227	0.688 9092	0.694 1900	1023	0.298 8282	0.301 1185	410
10	0.662 4834	0.656 1040	1251	0.699 4208	0.704 6010	1009	0.303 3871	0.305 6337	402
11	+0.649 6773	+0.643 2037	+1275	+0.709 7302	+0.714 8082	- 994	+0.307 8582	+0.310 0605	-394
12	0.636 6837	0.630 1180	1299	0.719 8345	0.724 8088	979	0.312 2403	0.314 3976	386
13	0.623 5071	0.616 8515	1322	0.729 7307	0.734 5999	964	0.316 5321	0.318 6438	377
14	0.610 1518	0.603 4085	1345	0.739 4161	0.744 1791	948	0.320 7325	0.322 7981	369
15	0.596 6222	0.589 7933	1368	0.748 8884	0.753 5438	932	0.324 8405	0.326 8595	360
16	+0.582 9224	+0.576 0101	+1391	+0.758 1450	+0.762 6916	- 916	+0.328 8550	+0.330 8269	-351
17	+0.569 0569	+0.562 0632	+1413	+0.767 1833	+0.771 6200	- 899	+0.332 7750	+0.334 6993	-342

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1918.0.	Y		Reduc. to Mean Eq'x of 1918.0.	Z		Reduc. to Mean Eq'x of 1918.0.
	True Equinox.	True Equinox.		True Equinox.	True Equinox.		True Equinox.	True Equinox.	
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
May 17	+0.569 0569	+0.562 0632	+1413	+0.767 1833	+0.771 6200	—899	+0.332 7750	+0.334 6993	—342
18	0.555 0297	0.547 9569	1436	0.776 0014	0.780 3271	882	0.336 5996	0.338 4758	333
19	0.540 8453	0.533 6955	1458	0.784 5970	0.788 8109	864	0.340 3278	0.342 1555	324
20	0.526 5080	0.519 2832	1480	0.792 9685	0.797 0694	846	0.343 9589	0.345 7377	314
21	0.512 0217	0.504 7241	1502	0.801 1134	0.805 1003	827	0.347 4919	0.349 2213	304
22	+0.497 3909	+0.490 0225	+1523	+0.809 0298	+0.812 9016	—808	+0.350 9259	+0.352 6055	—294
23	0.482 6194	0.475 1824	1544	0.816 7157	0.820 4719	789	0.354 2601	0.355 8897	284
24	0.467 7118	0.460 2083	1565	0.824 1700	0.827 8095	769	0.357 4940	0.359 0729	274
25	0.452 6722	0.445 1040	1586	0.831 3904	0.834 9124	749	0.360 6264	0.362 1544	263
26	0.437 5043	0.429 8737	1606	0.838 3753	0.841 7789	728	0.363 6568	0.365 1335	253
27	+0.422 2127	+0.414 5217	+1626	+0.845 1230	+0.848 4075	—707	+0.366 5844	+0.368 0094	—242
28	0.406 8011	0.399 0515	1646	0.851 6320	0.854 7963	686	0.369 4084	0.370 7812	231
29	0.391 2735	0.383 4676	1666	0.857 9002	0.860 9436	664	0.372 1278	0.373 4481	220
30	0.375 6342	0.367 7740	1685	0.863 9262	0.866 8478	642	0.374 7420	0.376 0095	209
31	0.359 8874	0.351 9749	1704	0.869 7082	0.872 5072	619	0.377 2505	0.378 4648	198
June 1	+0.344 0370	+0.336 0744	+1723	+0.875 2446	+0.877 9201	—596	+0.379 6522	+0.380 8128	—187
2	0.328 0875	0.320 0770	1741	0.880 5335	0.883 0846	573	0.381 9464	0.383 0529	175
3	0.312 0434	0.303 9871	1759	0.885 5731	0.887 9989	549	0.384 1322	0.385 1843	163
4	0.295 9089	0.287 8094	1776	0.890 3617	0.892 6614	525	0.386 2091	0.387 2065	151
5	0.279 6890	0.271 5483	1793	0.894 8978	0.897 0706	500	0.388 1763	0.389 1185	139
6	+0.263 3881	+0.255 2090	+1809	+0.899 1796	+0.901 2248	—475	+0.390 0330	+0.390 9198	—127
7	0.247 0116	0.238 7964	1825	0.903 2061	0.905 1230	450	0.391 7788	0.392 6099	115
8	0.230 5640	0.222 3152	1841	0.906 9755	0.908 7635	424	0.393 4130	0.394 1881	102
9	0.214 0507	0.205 7710	1856	0.910 4869	0.912 1454	398	0.394 9352	0.395 6542	90
10	0.197 4767	0.189 1685	1871	0.913 7391	0.915 2679	371	0.396 3451	0.397 0079	77
11	+0.180 8471	+0.172 5130	+1886	+0.916 7317	+0.918 1303	—344	+0.397 6424	+0.398 2488	—64
12	0.164 1670	0.155 8096	1900	0.919 4636	0.920 7317	317	0.398 8269	0.399 3767	51
13	0.147 4415	0.139 0633	1913	0.921 9346	0.923 0721	290	0.399 8981	0.400 3913	38
14	0.130 6755	0.122 2788	1926	0.924 1442	0.925 1509	262	0.400 8561	0.401 2926	25
15	0.113 8739	0.105 4613	1939	0.926 0921	0.926 9679	234	0.401 7008	0.402 0806	—12
16	+0.097 0416	+0.088 6154	+1951	+0.927 7781	+0.928 5228	—205	+0.402 4320	+0.402 7550	+1
17	0.080 1833	0.071 7459	1963	0.929 2020	0.929 8158	176	0.403 0497	0.403 3160	14
18	0.063 3039	0.054 8578	1974	0.930 3640	0.930 8467	147	0.403 5538	0.403 7633	28
19	0.046 4081	0.037 9555	1985	0.931 2638	0.931 6153	117	0.403 9444	0.404 0971	41
20	0.029 5005	0.021 0437	1995	0.931 9013	0.932 1220	87	0.404 2214	0.404 3174	55
21	+0.012 5857	+0.004 1271	+2004	+0.932 2772	+0.932 3670	—57	+0.404 3850	+0.404 4242	+68
22	—0.004 3317	—0.012 7900	2013	0.932 3914	0.932 3503	—27	0.404 4351	0.404 4177	82
23	0.021 2473	0.029 7030	2021	0.932 2439	0.932 0723	+4	0.404 3719	0.404 2978	96
24	0.038 1565	0.046 6074	2029	0.931 8354	0.931 5332	35	0.404 1953	0.404 0646	110
25	0.055 0552	0.063 4992	2036	0.931 1658	0.930 7331	66	0.403 9055	0.403 7181	124
26	—0.071 9388	—0.080 3736	+2043	+0.930 2351	+0.929 6720	+98	+0.403 5024	+0.403 2584	+138
27	0.088 8029	0.097 2263	2049	0.929 0438	0.928 3505	130	0.402 9861	0.402 6856	152
28	0.105 6433	0.114 0532	2054	0.927 5920	0.926 7685	162	0.402 3568	0.401 9997	166
29	0.122 4554	0.130 8494	2059	0.925 8799	0.924 9262	194	0.401 6143	0.401 2007	180
30	0.139 2347	0.147 6106	2063	0.923 9074	0.922 8236	227	0.400 7588	0.400 2887	194
July 1	—0.155 9765	—0.164 3319	+2066	+0.921 6748	+0.920 4612	+259	+0.399 7903	+0.399 2638	+208
2	—0.172 6761	—0.181 0086	+2069	+0.919 1829	+0.917 8396	+292	+0.398 7090	+0.398 1260	+222

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1918.0.	Y		Reduc. to Mean Eq'x of 1918.0.	Z		Reduc. to Mean Eq'x of 1918.0.
	True Equinox.			True Equinox.			True Equinox.		
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
July 1	-0.155 9765	-0.164 3319	+2066	+0.921 6748	+0.920 4612	+ 259	+0.399 7903	+0.399 2638	+208
2	0.172 6761	0.181 0086	2069	0.919 1829	0.917 8396	292	0.398 7090	0.398 1260	222
3	0.189 3288	0.197 6359	2071	0.916 4314	0.914 9583	325	0.397 5149	0.396 8757	236
4	0.205 9294	0.214 2087	2073	0.913 4206	0.911 8183	358	0.396 2084	0.395 5131	250
5	0.222 4731	0.230 7221	2074	0.910 1516	0.908 4205	391	0.394 7897	0.394 0384	264
6	-0.238 9549	-0.247 1710	+2074	+0.906 6250	+0.904 7652	+ 425	+0.393 2592	+0.392 4522	+279
7	0.255 3697	0.263 5504	2073	0.902 8414	0.900 8537	459	0.391 6174	0.390 7548	294
8	0.271 7125	0.279 8553	2072	0.898 8022	0.896 6870	493	0.389 8646	0.388 9468	308
9	0.287 9783	0.296 0807	2070	0.894 5082	0.892 2662	527	0.388 0014	0.387 0286	322
10	0.304 1620	0.312 2216	2067	0.889 9610	0.887 5929	561	0.386 0285	0.385 0011	336
11	-0.320 2590	-0.328 2735	+2064	+0.885 1621	+0.882 6688	+ 595	+0.383 9465	+0.382 8648	+351
12	0.336 2645	0.344 2316	2060	0.880 1131	0.877 4954	629	0.381 7562	0.380 6207	365
13	0.352 1740	0.360 0912	2055	0.874 8157	0.872 0743	663	0.379 4583	0.378 2692	379
14	0.367 9827	0.375 8479	2050	0.869 2715	0.866 4074	697	0.377 0534	0.375 8111	393
15	0.383 6863	0.391 4973	2044	0.863 4823	0.860 4964	731	0.374 5425	0.373 2475	407
16	-0.399 2803	-0.407 0349	+2037	+0.857 4500	+0.854 3434	+ 765	+0.371 9263	+0.370 5790	+421
17	0.414 7605	0.422 4566	2029	0.851 1767	0.847 9502	799	0.369 2057	0.367 8064	435
18	0.430 1226	0.437 7580	2021	0.844 6641	0.841 3186	834	0.366 3813	0.364 9306	449
19	0.445 3622	0.452 9349	2012	0.837 9142	0.834 4511	869	0.363 4542	0.361 9523	463
20	0.460 4755	0.467 9835	2002	0.830 9295	0.827 3496	903	0.360 4251	0.358 8727	477
21	-0.475 4585	-0.482 8999	+1991	+0.823 7118	+0.820 0162	+ 937	+0.357 2951	+0.355 6924	+491
22	0.490 3072	0.497 6801	1980	0.816 2630	0.812 4526	971	0.354 0648	0.352 4124	504
23	0.505 0180	0.512 3204	1968	0.808 5853	0.804 6614	1005	0.350 7352	0.349 0335	518
24	0.519 5868	0.526 8168	1955	0.800 6811	0.796 6446	1039	0.347 3073	0.345 5567	531
25	0.534 0100	0.541 1659	1942	0.792 5521	0.788 4038	1073	0.343 7817	0.341 9825	545
26	-0.548 2839	-0.555 3636	+1928	+0.784 2000	+0.779 9410	+1106	+0.340 1591	+0.338 3118	+558
27	0.562 4045	0.569 4061	1913	0.775 6270	0.771 2581	1139	0.336 4406	0.334 5456	572
28	0.576 3679	0.583 2894	1897	0.766 8347	0.762 3573	1172	0.332 6269	0.330 6847	585
29	0.590 1701	0.597 0095	1881	0.757 8260	0.753 2409	1205	0.328 7190	0.326 7300	598
30	0.603 8071	0.610 5623	1864	0.748 6024	0.743 9107	1238	0.324 7177	0.322 6823	611
31	-0.617 2746	-0.623 9436	+1846	+0.739 1661	+0.734 3688	+1271	+0.320 6240	+0.318 5428	+624
Aug. 1	0.630 5686	0.637 1491	1827	0.729 5193	0.724 6178	1303	0.316 4390	0.314 3126	637
2	0.643 6847	0.650 1749	1808	0.719 6647	0.714 6603	1336	0.312 1638	0.309 9927	650
3	0.656 6190	0.663 0166	1788	0.709 6049	0.704 4987	1368	0.307 7995	0.305 5843	662
4	0.669 3672	0.675 6703	1767	0.699 3423	0.694 1360	1400	0.303 3473	0.301 0887	675
5	-0.681 9253	-0.688 1319	+1746	+0.688 8802	+0.683 5751	+1431	+0.298 8087	+0.296 5073	+687
6	0.694 2894	0.700 3973	1724	0.678 2212	0.672 8189	1462	0.294 1847	0.291 8412	699
7	0.706 4553	0.712 4629	1701	0.667 3686	0.661 8708	1493	0.289 4769	0.287 0920	711
8	0.718 4196	0.724 3249	1677	0.656 3258	0.650 7341	1523	0.284 6867	0.282 2611	723
9	0.730 1784	0.735 9797	1653	0.645 0961	0.639 4121	1553	0.279 8155	0.277 3500	734
10	-0.741 7284	-0.747 4240	+1628	+0.633 6826	+0.627 9081	+1583	+0.274 8648	+0.272 3601	+746
11	0.753 0661	0.758 6542	1603	0.622 0889	0.616 2256	1612	0.269 8361	0.267 2930	757
12	0.764 1881	0.769 6673	1577	0.610 3186	0.604 3683	1641	0.264 7309	0.262 1501	768
13	0.775 0915	0.780 4602	1550	0.598 3751	0.592 3395	1669	0.259 5507	0.256 9330	779
14	0.785 7730	0.791 0296	1523	0.586 2620	0.580 1430	1697	0.254 2971	0.251 6432	790
15	-0.796 2296	-0.801 3727	+1495	+0.573 9829	+0.567 7822	+1725	+0.248 9715	+0.246 2822	+801
16	-0.806 4585	-0.811 4866	+1466	+0.561 5414	+0.555 2609	+1753	+0.243 5754	+0.240 8515	+812

SUN, 1918.

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GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1918.0.	Y		Reduc. to Mean Eq'x of 1918.0.	Z		Reduc. to Mean Eq'x of 1918.0.
	True Equinox.			True Equinox.			True Equinox.		
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Oct. 1	-0.992 3825	-0.991 0839	- 342	-0.119 8507	-0.127 6467	+2387	-0.051 9899	-0.055 3716	+1027
2	0.989 7119	0.988 2664	387	0.135 4335	0.143 2103	2385	0.058 7493	0.062 1226	1024
3	0.986 7475	0.985 1553	432	0.150 9767	0.158 7320	2382	0.065 4913	0.068 8553	1021
4	0.983 4900	0.981 7515	477	0.166 4757	0.174 2070	2379	0.072 2141	0.075 5675	1018
5	0.979 9400	0.978 0556	522	0.181 9253	0.189 6301	2375	0.078 9153	0.082 2571	1015
6	-0.976 0984	-0.974 0685	- 568	-0.197 3207	-0.204 9965	+2371	-0.085 5928	-0.088 9220	+1012
7	0.971 9662	0.969 7916	614	0.212 6570	0.220 3016	2365	0.092 2446	0.095 5602	1008
8	0.967 5449	0.965 2261	659	0.227 9296	0.235 5404	2359	0.098 8686	0.102 1696	1004
9	0.962 8353	0.960 3728	704	0.243 1334	0.250 7081	2352	0.105 4629	0.108 7481	999
10	0.957 8387	0.955 2333	749	0.258 2638	0.265 7999	2345	0.112 0251	0.115 2937	994
11	-0.952 5569	-0.949 8096	- 794	-0.273 3159	-0.280 8112	+2337	-0.118 5535	-0.121 8043	+ 989
12	0.946 9916	0.944 1032	839	0.288 2852	0.295 7374	2328	0.125 0460	0.128 2782	983
13	0.941 1445	0.938 1158	884	0.303 1672	0.310 5740	2318	0.131 5007	0.134 7132	977
14	0.935 0173	0.931 8493	928	0.317 9574	0.325 3168	2308	0.137 9156	0.141 1076	971
15	0.928 6120	0.925 3058	972	0.332 6515	0.339 9611	2297	0.144 2890	0.147 4595	965
16	-0.921 9308	-0.918 4872	-1017	-0.347 2450	-0.354 5029	+2286	-0.150 6189	-0.153 7670	+ 958
17	0.914 9755	0.911 3959	1062	0.361 7341	0.368 9381	2274	0.156 9036	0.160 0285	951
18	0.907 7485	0.904 0337	1106	0.376 1145	0.383 2627	2261	0.163 1414	0.166 2422	943
19	0.900 2515	0.896 4022	1150	0.390 3823	0.397 4728	2247	0.169 3306	0.172 4063	935
20	0.892 4861	0.888 5035	1194	0.404 5337	0.411 5644	2233	0.175 4693	0.178 5193	927
21	-0.884 4547	-0.880 3399	-1238	-0.418 5644	-0.425 5335	+2218	-0.181 5560	-0.184 5793	+ 918
22	0.876 1592	0.871 9128	1282	0.432 4710	0.439 3764	2202	0.187 5888	0.190 5844	909
23	0.867 6010	0.863 2241	1325	0.446 2491	0.453 0887	2186	0.193 5658	0.196 5328	900
24	0.858 7824	0.854 2760	1368	0.459 8946	0.466 6663	2169	0.199 4853	0.202 4229	890
25	0.849 7053	0.845 0704	1411	0.473 4033	0.480 1050	2151	0.205 3454	0.208 2526	880
26	-0.840 3717	-0.835 6095	-1454	-0.486 7709	-0.493 4006	+2133	-0.211 1443	-0.214 0202	+ 870
27	0.830 7840	0.825 8955	1497	0.499 9934	0.506 5487	2114	0.216 8800	0.219 7236	860
28	0.820 9443	0.815 9309	1539	0.513 0659	0.519 5446	2094	0.222 5506	0.225 3609	849
29	0.810 8556	0.805 7187	1581	0.525 9842	0.532 3843	2074	0.228 1542	0.230 9303	838
30	0.800 5207	0.795 2617	1623	0.538 7444	0.545 0638	2053	0.233 6890	0.236 4300	826
31	-0.789 9421	-0.784 5624	-1665	-0.551 3420	-0.557 5785	+2031	-0.239 1531	-0.241 8581	+ 814
Nov. 1	0.779 1229	0.773 6241	1706	0.563 7728	0.569 9243	2009	0.244 5447	0.247 2128	802
2	0.768 0665	0.762 4502	1747	0.576 0326	0.582 0971	1986	0.249 8621	0.252 4924	790
3	0.756 7758	0.751 0438	1787	0.588 1173	0.594 0928	1962	0.255 1034	0.257 6950	777
4	0.745 2545	0.739 4083	1827	0.600 0229	0.605 9072	1938	0.260 2669	0.262 8189	764
5	-0.733 5058	-0.727 5474	-1867	-0.611 7452	-0.617 5365	+1913	-0.265 3508	-0.267 8624	+ 751
6	0.721 5335	0.715 4647	1907	0.623 2805	0.628 9769	1887	0.270 3536	0.272 8241	737
7	0.709 3413	0.703 1640	1946	0.634 6251	0.640 2247	1861	0.275 2737	0.277 7022	723
8	0.696 9334	0.690 6497	1985	0.645 7752	0.651 2762	1834	0.280 1094	0.282 4951	709
9	0.684 3134	0.677 9252	2023	0.656 7272	0.662 1278	1807	0.284 8592	0.287 2014	694
10	-0.671 4855	-0.664 9948	-2061	-0.667 4776	-0.672 7764	+1779	-0.289 5217	-0.291 8199	+ 679
11	0.658 4536	0.651 8024	2099	0.678 0235	0.683 2185	1750	0.294 0956	0.296 3487	664
12	0.645 2219	0.638 5326	2136	0.688 3611	0.693 4509	1720	0.298 5792	0.300 7869	649
13	0.631 7949	0.625 0024	2172	0.698 4876	0.703 4709	1690	0.302 9715	0.305 1330	633
14	0.618 1766	0.611 2909	2208	0.708 4004	0.713 2757	1659	0.307 2713	0.309 3861	617
15	-0.604 3708	-0.597 3990	-2244	-0.718 0965	-0.722 8623	+1628	-0.311 4772	-0.313 5446	+ 600
16	-0.590 3820	-0.583 3201	-2279	-0.727 5729	-0.732 2281	+1596	-0.315 5881	-0.317 6076	+ 584

SUN, 1918.

25

GREENWICH MEAN TIME.

MEAN TIME.

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MOON, 1918.

41

MEAN TIME.

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MOON, 1948.

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14	12 42 53.10	1.8462	9 30 35.8	10.550	14	14 15 4.74	1.9883	16 59 57.0	7.918
15	12 44 45.12	1.8678	9 41 7.6	10.511	15	14 17 4.13	1.9915	17 7 50.0	7.868
16	12 46 37.24	1.8696	9 51 37.1	10.471	III	14 19 3.72	1.9948	17 15 38.7	7.776
17	12 48 29.47	1.8713	10 2 4.1	10.430	17	14 21 3.51	1.9982	17 23 23.1	7.704
18	12 50 21.80	1.8732	10 12 28.7	10.389	18	14 23 3.50	2.0016	17 31 3.2	7.631
19	12 52 14.25	1.8750	10 22 50.8	10.348	III	14 25 3.70	2.0049	17 38 38.8	7.557
20	12 54 6.80	1.8768	10 33 10.4	10.304	20	14 27 4.09	2.0082	17 46 10.0	7.482
21	12 55 59.47	1.8788	10 43 27.3	10.261	III	14 29 4.68	2.0116	17 53 36.6	7.407
22	12 57 52.25	1.8808	10 53 41.7	10.218	22	14 31 5.48	2.0151	18 0 58.8	7.332
23	12 59 45.16	1.8828	11 3 53.4	10.173	23	14 33 6.49	2.0185	18 8 16.4	7.264
24	13 1 38.18	1.8848	-11 14 2.4	-10.128	24	14 35 7.70	2.0219	-18 15 29.3	-7.177

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~~TABLE~~ MEAN TIME.

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MOON, 1918.

101

GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
OCTOBER 28.									OCTOBER 30.								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	9	40	50.11	1.9248	+8	43	57.9	-10.873	0	11	10	26.13	1.8314	-0	16	36.3	-11.391
1	9	42	45.50	1.9215	8	33	4.7	10.900	1	11	12	16.00	1.8309	0	27	59.6	11.385
2	9	44	40.69	1.9182	8	22	9.9	10.928	2	11	14	5.84	1.8304	0	39	22.5	11.379
3	9	46	35.68	1.9149	8	11	13.4	10.953	3	11	15	55.65	1.8300	0	50	45.1	11.373
4	9	48	30.48	1.9118	8	0	15.5	10.978	4	11	17	45.44	1.8298	1	2	7.2	11.365
5	9	50	25.09	1.9087	7	49	16.1	11.002	5	11	19	35.22	1.8294	1	13	28.9	11.358
6	9	52	19.52	1.9056	7	38	15.3	11.026	6	11	21	24.97	1.8292	1	24	50.1	11.349
7	9	54	13.76	1.9026	7	27	13.0	11.049	7	11	23	14.72	1.8291	1	36	10.8	11.341
8	9	56	7.83	1.8997	7	16	9.4	11.070	8	11	25	4.46	1.8289	1	47	31.0	11.331
9	9	58	1.72	1.8968	7	5	4.6	11.092	9	11	26	54.19	1.8288	1	58	50.5	11.320
10	9	59	55.44	1.8940	6	53	58.4	11.113	10	11	28	43.92	1.8288	2	10	9.4	11.309
11	10	1	49.00	1.8913	6	42	51.1	11.132	11	11	30	33.65	1.8288	2	21	27.6	11.298
12	10	3	42.39	1.8885	6	31	42.6	11.151	12	11	32	23.38	1.8289	2	32	45.1	11.285
13	10	5	35.62	1.8859	6	20	33.0	11.170	13	11	34	13.12	1.8291	2	44	1.8	11.273
14	10	7	28.70	1.8833	6	9	22.2	11.188	14	11	36	2.87	1.8293	2	55	17.8	11.260
15	10	9	21.62	1.8808	5	58	10.5	11.204	15	11	37	52.64	1.8296	3	6	33.0	11.245
16	10	11	14.39	1.8783	5	46	57.7	11.222	16	11	39	42.42	1.8298	3	17	47.2	11.230
17	10	13	7.02	1.8760	5	35	43.9	11.237	17	11	41	32.22	1.8302	3	29	0.6	11.216
18	10	14	59.51	1.8737	5	24	29.3	11.251	18	11	43	22.04	1.8306	3	40	13.1	11.199
19	10	16	51.86	1.8714	5	13	13.8	11.266	19	11	45	11.89	1.8311	3	51	24.5	11.183
20	10	18	44.08	1.8692	5	1	57.4	11.279	20	11	47	1.77	1.8316	4	2	35.0	11.166
21	10	20	36.16	1.8670	4	50	40.3	11.292	21	11	48	51.68	1.8322	4	13	44.4	11.148
22	10	22	28.12	1.8649	4	39	22.4	11.304	22	11	50	41.63	1.8328	4	24	52.7	11.130
23	10	24	19.95	1.8629	+4	28	3.8	-11.316	23	11	52	31.62	1.8335	-4	36	0.0	-11.111
OCTOBER 29.									OCTOBER 31.								
0	10	26	11.67	1.8610	+4	16	44.5	-11.327	0	11	54	21.65	1.8342	-4	47	6.0	-11.090
1	10	28	3.27	1.8591	4	5	24.6	11.337	1	11	56	11.72	1.8350	4	58	10.8	11.070
2	10	29	54.76	1.8572	3	54	4.1	11.346	2	11	58	1.85	1.8358	5	9	14.4	11.049
3	10	31	46.13	1.8553	3	42	43.1	11.355	3	11	59	52.02	1.8366	5	20	16.7	11.028
4	10	33	37.40	1.8537	3	31	21.5	11.363	4	12	1	42.24	1.8376	5	31	17.7	11.005
5	10	35	28.57	1.8521	3	19	59.5	11.370	5	12	3	32.53	1.8386	5	42	17.3	10.983
6	10	37	19.65	1.8504	3	8	37.1	11.378	6	12	5	22.87	1.8395	5	53	15.6	10.959
7	10	39	10.62	1.8488	2	57	14.2	11.384	7	12	7	13.27	1.8406	6	4	12.4	10.934
8	10	41	1.51	1.8474	2	45	51.0	11.389	8	12	9	3.74	1.8418	6	15	7.7	10.909
9	10	42	52.31	1.8459	2	34	27.5	11.394	9	12	10	54.28	1.8429	6	26	1.5	10.884
10	10	44	43.02	1.8445	2	23	3.7	11.398	10	12	12	44.89	1.8441	6	36	53.8	10.858
11	10	46	33.65	1.8433	2	11	39.7	11.402	11	12	14	35.57	1.8453	6	47	44.5	10.832
12	10	48	24.21	1.8420	2	0	15.5	11.405	12	12	16	26.33	1.8467	6	58	33.6	10.804
13	10	50	14.69	1.8408	1	48	51.1	11.407	13	12	18	17.17	1.8480	7	9	21.0	10.776
14	10	52	5.11	1.8397	1	37	26.7	11.408	14	12	20	8.09	1.8494	7	20	6.7	10.748
15	10	53	55.45	1.8385	1	26	2.1	11.410	15	12	21	59.10	1.8508	7	30	50.7	10.718
16	10	55	45.73	1.8375	1	14	37.5	11.410	16	12	23	50.19	1.8523	7	41	32.9	10.688
17	10	57	35.95	1.8366	1	3	12.9	11.410	17	12	25	41.37	1.8538	7	52	13.2	10.657
18	10	59	26.12	1.8357	0	51	48.3	11.409	18	12	27	32.65	1.8554	8	2	51.7	10.625
19	11	1	16.23	1.8348	0	40	23.8	11.408	19	12	29	24.02	1.8570	8	13	28.3	10.593
20	11	3	6.30	1.8341	0	28	59.4	11.406	20	12	31	15.49	1.8588	8	24	3.0	10.562
21	11	4	56.32	1.8333	0	17	35.1	11.403	21	12	33	7.07	1.8604	8	34	35.7	10.528
22	11	6	46.29	1.8326	+0	6	11.1	11.398	22	12	34	58.74	1.8622	8	45	6.4	10.494
23	11	8	36.23	1.8320	-0	5	12.7	11.395	23	12	36	50.53	1.8640	8	55	35.0	10.459
24	11	10	26.13	1.8314	-0	16	36.3	-11.391	24	12	38	42.42	1.8658	-9	6	1.5	-10.424

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ICH MEAN TIME.

MEAN TIME.

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 31.					DECEMBER 31.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	17 5 20.71	2.2571	-22 26 56.7	-0.093	12	17 32 33.11	2.2759	-22 19 32.2	+1.333
1	17 7 36.19	2.2589	22 26 58.8	+0.024	13	17 34 49.70	2.2771	22 18 8.6	1.453
2	17 9 51.78	2.2608	22 26 53.8	0.143	14	17 37 6.36	2.2782	22 16 37.8	1.574
3	17 12 7.49	2.2627	22 26 41.7	0.260	15	17 39 23.08	2.2792	22 14 59.7	1.694
4	17 14 23.30	2.2643	22 26 22.6	0.378	16	17 41 39.86	2.2802	22 13 14.5	1.814
5	17 16 39.20	2.2659	22 25 56.3	0.498	17	17 43 56.70	2.2811	22 11 22.0	1.935
6	17 18 55.21	2.2676	22 25 22.9	0.616	18	17 46 13.59	2.2819	22 9 22.3	2.056
7	17 21 11.31	2.2691	22 24 42.4	0.735	19	17 48 30.53	2.2827	22 7 15.3	2.177
8	17 23 27.50	2.2707	22 23 54.7	0.855	20	17 50 47.51	2.2834	22 5 1.1	2.297
9	17 25 43.79	2.2721	22 22 59.8	0.974	21	17 53 4.54	2.2841	22 2 39.7	2.418
10	17 28 0.15	2.2733	22 21 57.8	1.093	22	17 55 21.60	2.2847	22 0 11.0	2.538
11	17 30 16.59	2.2747	22 20 48.6	1.213	23	17 57 38.70	2.2853	21 57 35.1	2.658
12	17 32 33.11	2.2759	-22 19 32.2	+1.333	24	17 59 55.83	2.2857	-21 54 52.0	+2.779

PHASES OF THE MOON.

	d h m	d h m	d h m	d h m
(Last Quarter	Jan. 4 23 49.6	Apr. 4 1 33.1	June 30 20 42.9	Sept. 26 16 38.6
● New Moon	12 10 35.8	10 16 34.3	July 7 20 22.1	Oct. 4 15 5.2
) First Quarter	19 2 37.9	17 16 7.7	15 18 24.7	12 17 0.0
○ Full Moon	26 15 14.2	25 20 5.4	23 8 34.8	19 9 34.8
(Last Quarter	Feb. 3 19 52.0	May 3 10 26.2	30 1 13.9	26 5 35.4
● New Moon	10 22 4.6	10 1 0.9	Aug. 6 8 29.6	Nov. 3 9 1.6
) First Quarter	17 12 56.9	17 8 14.3	14 11 16.4	11 4 46.2
○ Full Moon	25 9 34.6	25 10 32.4	21 17 2.3	17 19 33.0
(Last Quarter	Mar. 5 12 43.6	June 1 16 20.0	28 7 27.1	24 22 25.3
● New Moon	12 7 52.4	8 10 2.7	Sept. 4 22 43.7	Dec. 3 3 19.3
) First Quarter	19 1 30.4	16 1 11.7	13 3 2.3	10 14 31.4
○ Full Moon	27 3 32.8	23 22 38.3	20 1 0.9	17 7 17.5
(Last Quarter	Apr. 4 1 33.1	30 20 42.9	26 16 38.6	24 18 30.6
● New Moon	10 16 34.3	July 7 20 22.1	Oct. 4 15 5.2	

APOGEE.

PERIGEE.

d h	d h	d h	d h
January 2 23.4	July 14 15.3	January 14 17.0	July 26 14.4
January 30 17.8	August 11 9.1	February 11 23.3	August 23 9.8
February 27 2.9	September 7 23.7	March 12 10.8	September 20 16.9
March 26 3.2	October 5 6.4	April 9 21.8	October 19 4.3
April 22 11.1	November 1 8.1	May 8 4.0	November 16 15.5
May 20 2.5	November 28 19.2	June 4 19.5	December 14 20.4
June 16 20.6	December 26 13.9	June 30 11.5	

MOON, 1918.
GREENWICH MEAN TIME.

MOON, 1918.
GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
		° ' "	° ' "	' "	' "	"	d			h m	m
May	17.0	141 55 38.4	-4 30 15.5	14 59.6	54 55.60	-1.233	7.0	May 17	U	6 4.4	1.73
	17.5	147 59 0.8	4 45 33.6	14 55.7	54 41.44	1.078	7.5	17	L	18 25.5	1.74
	18.0	153 59 47.9	4 57 36.1	14 52.5	54 29.76	0.868	8.0	18	U	6 46.2	1.73
	18.5	159 58 34.5	5 6 20.2	14 50.0	54 20.63	0.655	8.5	18	L	19 6.7	1.70
	19.0	165 55 55.0	5 11 44.0	14 48.2	54 14.04	0.444	9.0	19	U	7 27.1	1.69
	19.5	171 52 22.6	-5 13 46.4	14 47.1	54 9.96	-0.238	9.5	19	L	19 47.4	1.69
	20.0	177 48 28.8	5 12 27.0	14 46.7	54 8.29	-0.041	10.0	20	U	8 7.8	1.71
	20.5	183 44 43.9	5 7 46.9	14 46.8	54 8.94	+0.148	10.5	20	L	20 28.5	1.74
	21.0	189 41 35.7	4 59 47.7	14 47.6	54 11.78	0.324	11.0	21	U	8 49.5	1.77
	21.5	195 39 30.0	4 48 32.3	14 49.0	54 16.67	0.488	11.5	21	L	21 10.9	1.80
	22.0	201 38 50.1	-4 34 4.9	14 50.8	54 23.44	+0.638	12.0	22	U	9 32.8	1.83
	22.5	207 39 56.8	4 16 31.2	14 53.1	54 31.93	0.773	12.5	22	L	21 55.3	1.91
	23.0	213 43 8.6	3 55 58.8	14 55.8	54 41.93	0.890	13.0	23	U	10 18.6	1.97
	23.5	219 48 41.4	3 32 37.1	14 58.9	54 53.23	0.991	13.5	23	L	22 42.5	2.02
	24.0	225 56 48.9	3 6 37.8	15 2.3	55 5.65	1.076	14.0	24	U	11 7.1	2.03
	24.5	232 7 42.1	-2 38 14.6	15 5.9	55 18.98	+1.143	14.5	24	L	23 32.4	2.14
	25.0	238 21 30.3	2 7 43.9	15 9.8	55 33.02	1.195	15.0	25	U	11 58.4	2.19
	25.5	244 38 20.8	1 35 24.3	15 13.7	55 47.61	1.234	15.5			.....	...
	26.0	250 58 19.0	1 1 36.8	15 17.8	56 2.57	1.257	16.0	26	L	0 24.9	2.23
	26.5	257 21 29.1	-0 26 44.6	15 21.9	56 17.73	1.268	16.5	26	U	12 51.8	2.26
	27.0	263 47 54.3	+0 8 46.8	15 26.1	56 32.97	+1.270	17.0	27	L	1 19.0	2.27
	27.5	270 17 36.8	0 44 30.6	15 30.2	56 48.17	1.263	17.5	27	U	13 46.3	2.27
	28.0	276 50 37.7	1 19 58.2	15 34.4	57 3.25	1.249	18.0	28	L	2 13.5	2.26
	28.5	283 26 58.1	1 54 40.2	15 38.4	57 18.13	1.231	18.5	28	U	14 40.6	2.25
	29.0	290 6 38.6	2 28 6.8	15 42.4	57 32.78	1.209	19.0	29	L	3 7.4	2.23
	29.5	296 49 39.0	+2 59 47.9	15 46.3	57 47.12	+1.180	19.5	29	U	15 33.8	2.18
	30.0	303 35 58.9	3 29 13.8	15 50.1	58 1.10	1.150	20.0	30	L	3 59.8	2.15
	30.5	310 25 36.7	3 55 56.1	15 53.8	58 14.71	1.116	20.5	30	U	16 25.5	2.12
	31.0	317 18 30.0	4 19 27.4	15 57.4	58 27.87	1.076	21.0	31	L	4 50.8	2.10
	31.5	324 14 34.8	4 39 22.7	16 0.9	58 40.51	1.029	21.5	31	U	17 15.9	2.08
June	1.0	331 13 45.0	+4 55 19.2	16 4.1	58 52.53	+0.972	22.0	June 1	L	5 40.7	2.07
	1.5	338 15 52.3	5 6 57.3	16 7.2	59 3.78	0.903	22.5	1	U	18 5.6	2.07
	2.0	345 20 45.2	5 14 1.1	16 10.0	59 14.14	0.820	23.0	2	L	6 30.4	2.08
	2.5	352 28 8.8	5 16 18.9	16 12.5	59 23.40	0.719	23.5	2	U	18 55.5	2.10
	3.0	359 37 44.7	5 13 43.7	16 14.7	59 31.33	0.600	24.0	3	L	7 20.8	2.13
	3.5	6 49 10.2	+5 6 13.7	16 16.4	59 37.72	+0.461	24.5	3	U	19 46.6	2.17
	4.0	14 1 58.6	4 53 52.8	16 17.7	59 42.32	0.302	25.0	4	L	8 12.9	2.22
	4.5	21 15 39.7	4 36 50.8	16 18.4	59 44.89	+0.123	25.5	4	U	20 39.9	2.27
	5.0	28 29 39.6	4 15 23.6	16 18.5	59 45.19	-0.075	26.0	5	L	9 7.5	2.33
	5.5	35 43 22.0	3 49 52.5	16 17.9	59 43.04	0.234	26.5	5	U	21 35.8	2.38
	6.0	42 56 8.5	+3 20 44.7	16 16.6	59 38.33	-0.503	27.0	6	L	10 4.7	2.43
	6.5	50 7 20.1	2 48 31.7	16 14.6	59 30.95	0.727	27.5	6	U	22 34.1	2.46
	7.0	57 16 18.2	2 13 48.9	16 11.9	59 20.91	0.945	28.0	7	L	11 3.8	2.43
	7.5	64 22 25.6	1 37 14.2	16 8.4	59 8.30	1.153	28.5	7	U	23 33.6	2.48
	8.0	71 25 8.1	0 59 26.8	16 4.4	58 53.31	1.343	29.0			.....	...
	8.5	78 23 55.1	+0 21 6.1	15 59.7	58 36.16	-1.510	0.1	8	L	12 3.3	2.47
	9.0	85 18 20.3	-0 17 10.0	15 54.5	58 17.18	-1.648	0.6	9	U	0 32.7	2.42

MOON, 1918.

GREENWICH MEAN TIME.

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GREENWICH MEAN TIME.

MEAN TIME.

MOON, 1918.
GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ' "	"			"	"	h m
Jan.	1	19 2 53.57	-13.675	-20 28 44.2	+22.65	9.833 9126	-2120.4	4.90	12.90	0 21.4
	2	18 57 16.17	14.366	20 20 21.5	19.24	9.829 7745	1321.4	4.94	13.02	0 11.9
	3	18 51 27.74	14.591	20 13 21.5	15.75	9.827 5886	- 499.0	4.97	13.09	{ 0 2.3 23 52.6
	4	18 45 39.54	14.349	20 7 46.1	12.18	9.827 3712	+ 313.5	4.97	13.09	23 43.1
	5	18 40 2.44	13.675	20 3 37.6	8.52	9.829 0600	1084.5	4.95	13.04	23 33.9
	6	18 34 46.16	-12.626	-20 0 57.6	+ 4.81	9.832 5230	+1788.3	4.91	12.94	23 25.2
	7	18 29 58.79	11.279	19 59 46.9	+ 1.08	9.837 5749	2406.2	4.86	12.79	23 17.1
	8	18 25 46.46	9.720	20 0 5.1	- 2.58	9.843 9959	2928.2	4.78	12.60	23 9.6
	9	18 22 13.31	8.027	20 1 49.5	6.09	9.851 5511	3351.5	4.70	12.39	23 2.8
	10	18 19 21.63	6.275	20 4 55.5	9.36	9.860 0067	3679.6	4.61	12.15	22 56.7
	11	18 17 12.15	- 4.519	-20 9 16.6	-12.34	9.869 1432	+3920.3	4.52	11.89	22 51.3
	12	18 15 44.36	2.807	20 14 44.7	14.94	9.878 7621	4083.5	4.42	11.63	22 46.6
	13	18 14 56.82	- 1.169	20 21 10.3	17.12	9.888 6912	4180.6	4.32	11.37	22 42.5
	14	18 14 47.48	+ 0.374	20 28 23.1	18.88	9.898 7851	4222.7	4.22	11.11	22 38.9
	15	18 15 13.94	1.812	20 36 12.9	20.19	9.908 9244	4220.2	4.12	10.85	22 36.0
	16	18 16 13.58	+ 3.139	-20 44 29.0	-21.08	9.919 0136	+4182.2	4.02	10.60	22 33.5
	17	18 17 43.75	4.357	20 53 1.4	21.55	9.928 9770	4116.8	3.93	10.36	22 31.5
	18	18 19 41.88	5.469	21 1 40.4	21.64	9.938 7577	4030.8	3.84	10.13	22 29.9
	19	18 22 5.48	6.481	21 10 17.0	21.36	9.948 3128	3929.7	3.76	9.91	22 28.7
	20	18 24 52.23	7.400	21 18 43.0	20.75	9.957 6118	3818.0	3.68	9.70	22 27.9
	21	18 27 59.98	+ 8.233	-21 26 50.5	-19.84	9.966 6335	+3699.2	3.61	9.50	22 27.4
	22	18 31 26.77	8.987	21 34 32.9	18.65	9.975 3646	3576.2	3.54	9.31	22 27.2
	23	18 35 10.80	9.671	21 41 43.9	17.22	9.983 7976	3451.2	3.47	9.13	22 27.2
	24	18 39 10.46	10.290	21 48 17.8	15.57	9.991 9300	3325.8	3.40	8.96	22 27.5
	25	18 43 24.27	10.851	21 54 9.7	13.72	9.999 7622	3201.3	3.34	8.80	22 27.9
	26	18 47 50.91	+11.361	-21 59 15.1	-11.70	0.007 2976	+3078.6	3.28	8.65	22 28.6
	27	18 52 29.20	11.823	22 3 30.1	9.52	0.014 5416	2958.6	3.23	8.51	22 29.5
	28	18 57 18.06	12.242	22 6 51.1	7.21	0.021 5011	2841.5	3.18	8.38	22 30.5
	29	19 2 16.53	12.624	22 9 15.0	4.77	0.028 1832	2727.6	3.13	8.25	22 31.7
	30	19 7 23.74	12.971	22 10 39.0	- 2.22	0.034 5965	2617.4	3.08	8.13	22 33.0
	31	19 12 38.91	+13.288	-22 11 0.6	+ 0.43	0.040 7496	+2510.7	3.04	8.01	22 34.4
Feb.	1	19 18 1.33	13.576	22 10 17.7	3.16	0.046 6508	2407.6	3.00	7.90	22 36.0
	2	19 23 30.37	13.840	22 8 28.2	5.97	0.052 3091	2308.1	2.96	7.80	22 37.6
	3	19 29 5.46	14.081	22 5 30.4	8.85	0.057 7327	2212.1	2.92	7.70	22 39.3
	4	19 34 46.07	14.300	22 1 22.9	11.79	0.062 9300	2119.6	2.89	7.61	22 41.1
	5	19 40 31.72	+14.501	-21 56 4.2	+14.78	0.067 9092	+2030.3	2.86	7.52	22 43.0
	6	19 46 22.00	14.686	21 49 33.0	17.82	0.072 6778	1944.0	2.83	7.44	22 45.0
	7	19 52 16.51	14.854	21 41 48.4	20.90	0.077 2427	1860.6	2.80	7.36	22 47.0
	8	19 58 14.90	15.009	21 32 49.4	24.02	0.081 6111	1780.1	2.77	7.29	22 49.1
	9	20 4 16.84	15.151	21 22 35.1	27.17	0.085 7893	1702.2	2.74	7.22	22 51.3
	10	20 10 22.05	+15.281	-21 11 4.8	+30.36	0.089 7835	+1628.6	2.72	7.16	22 53.5
	11	20 16 30.27	15.402	20 58 17.8	33.56	0.093 5990	1553.3	2.69	7.09	22 55.7
	12	20 22 41.25	15.512	20 44 13.6	36.79	0.097 2412	1482.1	2.67	7.03	22 58.0
	13	20 28 54.78	15.614	20 28 51.5	40.05	0.100 7148	1412.8	2.65	6.97	23 0.3
	14	20 35 10.67	15.709	20 12 11.3	43.31	0.104 0241	1345.2	2.63	6.92	23 2.7
	15	20 41 28.74	+15.796	-19 54 12.5	+46.60	0.107 1728	+1279.1	2.61	6.87	23 5.1
	16	20 47 48.85	+15.878	-19 34 54.6	+49.90	0.110 1646	+1214.2	2.59	6.83	23 7.5

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
Feb. 16	20 47 48.85	+15.878	-19 34 54.6	+ 49.90	0.110 1646	+1214.2	2.59	6.83	23 7.5
17	20 54 10.86	15.955	19 14 17.4	53.20	0.113 0020	1150.5	2.57	6.79	23 9.9
18	21 0 34.66	16.027	18 52 20.7	56.52	0.115 6876	1087.7	2.56	6.74	23 12.4
19	21 7 0.15	16.096	18 29 4.1	59.86	0.118 2235	1025.6	2.54	6.70	23 14.9
20	21 13 27.25	16.162	18 4 27.5	63.19	0.120 6108	963.9	2.52	6.66	23 17.5
21	21 19 55.90	+16.225	-17 38 30.7	+ 66.54	0.122 8504	+ 902.4	2.51	6.63	23 20.0
22	21 26 26.04	16.286	17 11 13.5	69.89	0.124 9425	841.0	2.50	6.60	23 22.6
23	21 32 57.62	16.346	16 42 35.8	73.25	0.126 8868	779.2	2.49	6.57	23 25.2
24	21 39 30.63	16.406	16 12 37.6	76.60	0.128 6824	717.0	2.48	6.54	23 27.9
25	21 46 5.05	16.463	15 41 18.9	79.95	0.130 3277	654.0	2.47	6.52	23 30.5
26	21 52 40.87	+16.522	-15 8 39.6	+ 83.31	0.131 8205	+ 589.8	2.47	6.50	23 33.2
27	21 59 18.11	16.581	14 34 39.8	86.67	0.133 1575	524.2	2.46	6.48	23 35.9
28	22 5 56.78	16.641	13 59 19.6	90.01	0.134 3355	457.0	2.45	6.46	23 38.7
Mr. 1	22 12 36.90	16.702	13 22 39.3	93.35	0.135 3494	387.6	2.45	6.44	23 41.4
2	22 19 18.51	16.765	12 44 39.1	96.67	0.136 1943	315.9	2.44	6.43	23 44.2
3	22 26 1.65	+16.830	-12 5 19.4	+ 99.97	0.136 8636	+ 241.4	2.44	6.42	23 47.0
4	22 32 46.36	16.896	11 24 40.5	103.26	0.137 3504	163.6	2.43	6.41	23 49.8
5	22 39 32.68	16.964	10 42 43.2	106.51	0.137 6458	+ 81.9	2.43	6.41	23 52.7
6	22 46 20.67	17.035	9 59 28.3	109.73	0.137 7404	- 3.8	2.43	6.41	23 55.6
7	22 53 10.36	17.107	9 14 56.5	112.91	0.137 6237	94.2	2.43	6.41	23 58.5
8	23 0 1.81	+17.181	- 8 29 9.3	+116.02	0.137 2840	- 189.9	2.43	6.41	...
9	23 6 55.03	17.255	7 42 8.0	119.08	0.136 7074	291.4	2.44	6.42	0 1.5
10	23 13 50.04	17.329	6 53 54.3	122.05	0.135 8800	399.4	2.45	6.44	0 4.4
11	23 20 46.84	17.404	6 4 30.6	124.91	0.134 7849	514.4	2.45	6.45	0 7.5
12	23 27 45.40	17.476	5 13 59.4	127.67	0.133 4051	636.8	2.46	6.47	0 10.5
13	23 34 45.66	+17.545	- 4 22 23.8	+130.27	0.131 7217	- 767.5	2.47	6.50	0 13.6
14	23 41 47.51	17.609	3 29 47.6	132.71	0.129 7140	906.9	2.48	6.53	0 16.7
15	23 48 50.81	17.665	2 36 15.2	134.95	0.127 3611	1055.5	2.49	6.56	0 19.8
16	23 55 55.34	17.711	1 41 51.8	136.96	0.124 6398	1213.8	2.50	6.60	0 22.9
17	0 3 0.83	17.744	- 0 46 43.4	138.69	0.121 5268	1382.0	2.52	6.65	0 26.1
18	0 10 6.92	+17.760	+ 0 9 2.9	+140.11	0.117 9979	-1560.4	2.54	6.71	0 29.2
19	0 17 13.15	17.756	1 5 19.2	141.18	0.114 0291	1748.6	2.57	6.77	0 32.4
20	0 24 18.99	17.726	2 1 56.4	141.85	0.109 5970	1946.4	2.60	6.84	0 35.6
21	0 31 23.76	17.666	2 58 44.4	142.07	0.104 6788	2153.4	2.63	6.92	0 38.7
22	0 38 26.69	17.572	3 55 31.9	141.80	0.099 2541	2368.4	2.66	7.00	0 41.8
23	0 45 26.88	+17.437	+ 4 52 6.6	+141.00	0.093 3051	-2500.1	2.70	7.09	0 44.9
24	0 52 23.32	17.259	5 48 15.4	139.64	0.086 8171	2817.1	2.74	7.20	0 47.9
25	0 59 14.90	17.031	6 43 44.5	137.69	0.079 7806	3047.0	2.78	7.32	0 50.8
26	1 6 0.37	16.750	7 38 19.5	135.13	0.072 1909	3277.7	2.83	7.45	0 53.6
27	1 12 38.44	16.413	8 31 45.8	131.96	0.064 0490	3506.7	2.88	7.59	0 56.3
28	1 19 7.74	+16.019	+ 9 23 48.7	+128.19	0.055 3623	-3731.3	2.94	7.75	0 58.9
29	1 25 26.87	15.565	10 14 14.1	123.83	0.046 1443	3949.0	3.00	7.91	1 1.2
30	1 31 34.39	15.052	11 2 48.3	118.93	0.036 4149	4157.0	3.07	8.09	1 3.4
31	1 37 28.92	14.482	11 49 18.5	113.51	0.026 2005	4352.9	3.15	8.28	1 5.4
Apr. 1	1 43 9.06	13.854	12 33 33.1	107.63	0.015 5321	4534.8	3.23	8.49	1 7.1
2	1 48 33.50	+13.174	+13 15 21.4	+101.33	0.004 4465	-4700.4	3.31	8.71	1 8.5
3	1 53 41.00	+12.443	+13 54 34.1	+ 94.67	9.992 9844	-4848.2	3.40	8.94	1

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter	Hor. Paral- lax.	Trans Meridi- an of Green- wich
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ' "	"			"	"	h
Apr.	1	1 43 9.06	+13.854	+12 33 33.1	+107.63	0.015 5321	-4534.8	3.23	8.49	1
	2	1 48 33.50	13.174	13 15 21.4	101.33	0.004 4465	4700.4	3.31	8.71	1
	3	1 53 41.00	12.443	13 54 34.1	94.67	9.992 9844	4848.2	3.40	8.94	1
	4	1 58 30.38	11.665	14 31 3.0	87.69	9.981 1903	4976.9	3.49	9.19	1
	5	2 3 0.56	10.844	15 4 41.0	80.44	9.969 1116	5085.2	3.59	9.45	1
	6	2 7 10.56	+ 9.984	+15 35 22.2	+ 72.96	9.956 7985	-5172.1	3.69	9.72	1
	7	2 10 59.49	9.089	16 3 1.4	65.28	9.944 3036	5236.5	3.80	10.00	1
	8	2 14 26.58	8.164	16 27 34.3	57.44	9.931 6816	5278.0	3.91	10.29	1
	9	2 17 31.16	7.214	16 48 57.4	49.46	9.918 9885	5295.5	4.02	10.60	1
	10	2 20 12.67	6.243	17 7 7.6	41.37	9.906 2833	5287.9	4.14	10.92	1
	11	2 22 30.70	+ 5.258	+17 22 2.3	+ 33.17	9.893 6270	-5254.6	4.27	11.24	1
	12	2 24 24.98	4.264	17 33 39.5	24.92	9.881 0824	5194.7	4.39	11.57	1
	13	2 25 55.37	3.269	17 41 58.0	16.61	9.868 7145	5107.1	4.52	11.91	1
	14	2 27 1.93	2.280	17 46 56.7	+ 8.29	9.856 5913	4990.8	4.64	12.24	0
	15	2 27 44.93	1.306	17 48 35.9	- 0.02	9.844 7822	4845.1	4.77	12.58	0
	16	2 28 4.81	+ 0.356	+17 46 56.5	- 8.26	9.833 3589	-4669.2	4.90	12.92	0
	17	2 28 2.31	- 0.558	17 42 0.5	16.38	9.822 3942	4462.9	5.03	13.25	0
	18	2 27 38.39	1.427	17 33 51.8	24.31	9.811 9616	4225.9	5.15	13.57	0
	19	2 26 54.27	2.239	17 22 35.6	31.98	9.802 1338	3959.0	5.27	13.88	0
	20	2 25 51.46	2.982	17 8 19.7	39.28	9.792 9816	3663.0	5.38	14.17	0
	21	2 24 31.74	- 3.647	+16 51 13.6	- 46.14	9.784 5732	-3339.5	5.49	14.45	0
	22	2 22 57.10	4.223	16 31 29.5	52.43	9.776 9718	2991.0	5.59	14.71	0
	23	2 21 9.81	4.701	16 9 22.1	58.07	9.770 2338	2620.5	5.67	14.94	0
	24	2 19 12.29	5.075	15 45 8.4	62.94	9.764 4079	2231.8	5.75	15.14	0
	25	2 17 7.10	5.339	15 19 8.0	66.95	9.759 5323	1829.1	5.81	15.31	0
	26	2 14 56.91	- 5.492	+14 51 42.3	- 70.03	9.755 6352	-1417.5	5.86	15.45	{ ⁰ ₂₃ 5
	27	2 12 44.38	5.534	14 23 14.2	72.14	9.752 7315	1001.8	5.90	15.55	23 4
	28	2 10 32.17	5.466	13 54 7.8	73.23	9.750 8255	587.2	5.93	15.62	23 4
	29	2 8 22.82	5.296	13 24 47.3	73.30	9.749 9077	- 179.0	5.94	15.65	23 3
	30	2 6 18.73	5.030	12 55 37.2	72.38	9.749 9576	+ 218.2	5.94	15.65	23 3
May	1	2 4 22.10	- 4.676	+12 27 0.7	- 70.51	9.750 9429	+ 600.0	5.92	15.61	23 2
	2	2 2 34.91	4.245	11 59 19.7	67.77	9.752 8228	963.2	5.89	15.54	23 1
	3	2 0 58.87	3.747	11 32 54.1	64.24	9.755 5487	1204.5	5.86	15.45	23 1
	4	1 59 35.47	3.195	11 8 2.0	60.00	9.759 0654	1621.9	5.81	15.33	23
	5	1 58 25.89	2.598	10 44 58.6	55.19	9.763 3136	1914.0	5.76	15.18	23
	6	1 57 31.08	- 1.966	+10 23 56.8	- 49.89	9.768 2320	+2180.3	5.70	15.01	22 5
	7	1 56 51.73	1.310	10 5 6.9	44.21	9.773 7582	2420.6	5.63	14.82	22 5
	8	1 56 28.34	- 0.637	9 48 36.8	38.26	9.779 8307	2635.5	5.55	14.61	22 5
	9	1 56 21.21	+ 0.044	9 34 32.0	32.12	9.786 3890	2825.8	5.47	14.39	22 4
	10	1 56 30.45	0.726	9 22 55.9	25.87	9.793 3759	2992.9	5.38	14.16	22 4
	11	1 56 56.06	+ 1.407	+ 9 13 50.3	- 19.59	9.800 7376	+3138.3	5.29	13.92	22 4
	12	1 57 37.92	2.080	9 7 15.3	13.34	9.808 4234	3263.4	5.20	13.68	22 3
	13	1 58 35.82	2.743	9 3 9.6	7.15	9.816 3870	3369.9	5.10	13.43	22 3
	14	1 59 49.47	3.393	9 1 31.0	- 1.09	9.824 5856	3459.7	5.01	13.18	22 3
	15	2 1 18.56	4.029	9 2 16.3	+ 4.83	9.832 9812	3534.2	4.91	12.93	22 2
	16	2 3 2.75	+ 4.650	+ 9 5 21.5	+ 10.57	9.841 5387	+3594.9	4.82	12.67	22 2
	17	2 5 1.64	+ 5.255	+ 9 10 42.2	+ 16.12	9.850 2267	+3648.1	4.72	12.42	22 2

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.		
	Noon.				Noon.									Noon.	
	h	m	s	s	°	'	"	"			"	"	h	m	
May	17	2	5	1.64	+ 5.255	+ 9	10	42.2	+16.12	9.850 2267	+3643.1	4.72	12.42	22 25.9	
	18	2	7	14.87	5.845	9	18	13.6	21.46	9.859 0175	3680.6	4.63	12.17	22 24.4	
	19	2	9	42.07	6.419	9	27	50.5	26.58	9.867 8859	3708.2	4.53	11.93	22 23.1	
	20	2	12	22.88	6.980	9	39	27.6	31.47	9.876 8102	3727.2	4.44	11.69	22 22.1	
	21	2	15	16.98	7.526	9	52	59.4	36.14	9.885 7705	3738.5	4.35	11.45	22 21.2	
	22	2	18	24.04	+ 8.060	+10	8	20.4	+40.57	9.894 7492	+3742.7	4.26	11.21	22 20.6	
	23	2	21	43.79	8.584	10	25	25.0	44.77	9.903 7305	3740.9	4.17	10.98	22 20.2	
	24	2	25	15.98	9.097	10	44	7.7	48.74	9.912 7009	3733.6	4.08	10.76	22 20.0	
	25	2	29	0.39	9.602	11	4	22.9	52.49	9.921 6475	3721.1	4.00	10.54	22 20.0	
	26	2	32	56.85	10.101	11	26	5.1	56.00	9.930 5584	3704.0	3.92	10.33	22 20.2	
	27	2	37	5.21	+10.595	+11	49	8.9	+59.28	9.939 4234	+3682.7	3.84	10.12	22 20.5	
	28	2	41	25.39	11.085	12	13	28.8	62.34	9.948 2322	3657.3	3.76	9.92	22 21.1	
	29	2	45	57.29	11.573	12	38	59.2	65.16	9.956 9752	3628.0	3.69	9.72	22 21.9	
	30	2	50	40.91	12.061	13	5	34.6	67.76	9.965 6433	3594.7	3.62	9.53	22 22.9	
	31	2	55	36.25	12.551	13	33	9.7	70.12	9.974 2270	3557.7	3.55	9.34	22 24.0	
	June	1	3	0	43.36	+13.042	+14	1	38.7	+72.25	9.982 7171	+3516.8	3.48	9.16	22 25.4
		2	3	6	2.29	13.537	14	30	55.9	74.14	9.991 1043	3471.8	3.41	8.98	22 26.9
		3	3	11	33.16	14.037	15	0	55.3	75.77	9.999 3781	3422.4	3.34	8.81	22 28.7
		4	3	17	16.10	14.543	15	31	31.0	77.16	0.007 5280	3368.4	3.28	8.65	22 30.7
		5	3	23	11.26	15.055	16	2	36.6	78.26	0.015 5429	3309.7	3.22	8.49	22 32.8
6		3	29	18.81	+15.575	+16	34	5.4	+79.09	0.023 4104	+3245.7	3.17	8.34	22 35.2	
7		3	35	38.94	16.104	17	5	50.6	79.62	0.031 1177	3175.9	3.11	8.19	22 37.8	
8		3	42	11.84	16.639	17	37	44.7	79.83	0.038 6499	3099.9	3.06	8.05	22 40.6	
9		3	48	57.68	17.182	18	9	39.9	79.71	0.045 9916	3017.1	3.01	7.92	22 43.7	
10		3	55	56.64	17.732	18	41	28.0	79.23	0.053 1260	2926.9	2.96	7.79	22 46.9	
	11	4	3	8.86	+18.287	+19	13	0.1	+78.37	0.060 0345	+2828.9	2.91	7.67	22 50.4	
	12	4	10	34.42	18.844	19	44	6.8	77.11	0.066 6977	2722.3	2.87	7.55	22 54.1	
	13	4	18	13.36	19.401	20	14	38.0	75.42	0.073 0944	2606.7	2.82	7.44	22 58.0	
	14	4	26	5.63	19.954	20	44	23.2	73.27	0.079 2023	2481.6	2.78	7.33	23 2.2	
	15	4	34	11.09	20.499	21	13	11.1	70.64	0.084 9985	2346.8	2.75	7.23	23 6.6	
	16	4	42	29.46	+21.029	+21	40	50.2	+67.53	0.090 4590	+2202.0	2.72	7.14	23 11.1	
	17	4	51	0.32	21.539	22	7	8.6	63.91	0.095 5601	2047.2	2.69	7.06	23 15.9	
	18	4	59	43.11	22.022	22	31	54.0	59.78	0 100 2784	1882.8	2.66	6.99	23 20.9	
	19	5	8	37.08	22.469	22	54	54.2	55.16	0.104 5912	1709.5	2.63	6.92	23 26.0	
	20	5	17	41.30	22.875	23	15	57.6	50.04	0.108 4777	1527.9	2.60	6.85	23 31.3	
	21	5	26	54.68	+23.231	+23	34	52.6	+44.47	0.111 9198	+1339.4	2.58	6.80	23 36.8	
	22	5	36	15.92	23.530	23	51	28.8	38.48	0.114 9025	1145.4	2.56	6.75	23 42.3	
	23	5	45	43.62	23.767	24	5	36.9	32.14	0.117 4146	947.5	2.54	6.71	23 47.9	
	24	5	55	16.23	23.938	24	17	9.0	25.50	0.119 4489	747.6	2.53	6.68	23 53.6	
	25	6	4	52.10	24.040	24	25	58.9	18.63	0.121 0032	547.8	2.52	6.66	23 59.3	
	26	6	14	29.57	+24.071	+24	32	2.0	+11.62	0.122 0800	+ 349.9	2.52	6.64	...	
	27	6	24	6.96	24.033	24	35	16.0	+ 4.54	0.122 6857	+ 155.7	2.51	6.63	0 5.0	
	28	6	33	42.62	23.928	24	35	40.2	- 2.52	0.122 8319	- 32.9	2.51	6.63	0 10.7	
	29	6	43	15.00	23.760	24	33	15.7	9.50	0.122 5331	214.9	2.52	6.64	0 16.3	
	30	6	52	42.65	23.535	24	28	5.5	16.32	0.121 8067	388.9	2.52	6.65	0 21.8	
July	1	7	2	4.26	+23.257	+24	20	13.7	-22.95	0.120 6733	- 554.1	2.53	6.67	0 27.3	
	2	7	11	18.65	+22.935	+24	9	46.0	-29.31	0.119 1544	- 710.1	2.54	6.69	0 32.6	

MERCURY, 1918.
GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.			
	Noon.				Noon.									Noon.	Noon.	Noon.
	h	m	s	s	°	'	"	"			"	"	h	m		
eg.	16	11	4	53.19	+ 1.661	+2	2	16.9	- 37.80	9.864 4381	-3154.9	4.56	12.02	1	28.4	
	17	11	5	24.10	0.910	1	48	20.7	31.81	9.856 9154	3111.1	4.64	12.23	1	25.0	
	18	11	5	36.68	+ 0.134	1	36	53.5	25.38	9.849 5199	3048.5	4.72	12.44	1	21.2	
	19	11	5	30.36	- 0.664	1	28	5.7	18.53	9.842 3002	2964.0	4.80	12.65	1	17.2	
	20	11	5	4.65	1.481	1	22	7.5	11.25	9.835 3126	2854.6	4.88	12.86	1	12.8	
	21	11	4	19.20	- 2.308	+1	19	8.7	- 3.58	9.828 6205	-2717.1	4.95	13.06	1	8.1	
	22	11	3	13.87	3.136	1	19	18.4	+ 4.45	9.822 2955	2548.2	5.03	13.25	1	3.1	
	23	11	1	48.74	3.956	1	22	44.4	12.77	9.816 4169	2344.7	5.10	13.43	0	57.7	
	24	11	0	4.17	4.754	1	29	32.9	21.30	9.811 0708	2104.1	5.16	13.59	0	52.0	
	25	10	58	0.88	5.512	1	39	47.8	29.94	9.806 3491	1823.8	5.22	13.74	0	46.1	
	26	10	55	40.02	- 6.215	+1	53	29.7	+ 38.54	9.802 3493	-1502.5	5.26	13.87	0	39.8	
	27	10	53	3.14	6.843	2	10	36.0	46.93	9.799 1698	1140.2	5.30	13.97	0	33.3	
	28	10	50	12.32	7.374	2	30	59.4	54.94	9.796 9086	737.6	5.33	14.05	0	26.5	
	29	10	47	10.11	7.789	2	54	28.4	62.36	9.795 6595	- 297.5	5.35	14.09	0	19.5	
	30	10	43	59.57	8.065	3	20	46.3	68.97	9.795 5078	+ 175.9	5.35	14.09	0	12.5	
	pt.	31	10	40	44.23	- 8.186	+3	49	30.9	+ 74.56	9.796 5253	+ 676.0	5.33	14.06	0 5.3	
		1	10	37	27.99	8.138	4	20	15.8	78.96	9.798 7680	1195.3	5.31	13.98	23	51.0
		2	10	34	15.05	7.910	4	52	30.1	81.99	9.802 2704	1724.2	5.27	13.87	23	44.0
		3	10	31	9.79	7.498	5	25	39.5	83.54	9.807 0439	2252.7	5.21	13.72	23	37.2
		4	10	28	16.62	6.903	5	59	7.5	83.54	9.813 0745	2770.1	5.13	13.53	23	30.7
		5	10	25	39.84	- 6.134	+6	32	16.8	+ 81.97	9.820 3231	+3266.0	5.05	13.31	23	24.5
		6	10	23	23.49	5.203	7	4	30.1	78.89	9.828 7262	3730.7	4.95	13.05	23	18.7
		7	10	21	31.24	4.129	7	35	11.9	74.36	9.838 1987	4155.7	4.84	12.77	23	13.3
		8	10	20	6.28	2.933	8	3	49.0	68.52	9.848 6362	4534.0	4.73	12.47	23	8.5
		9	10	19	11.21	1.641	8	29	51.7	61.52	9.859 9208	4860.6	4.61	12.15	23	4.1
		10	10	18	48.06	- 0.279	+8	52	53.9	+ 53.51	9.871 9232	+5131.9	4.49	11.82	23	0.4
		11	10	18	58.20	+ 1.129	9	12	33.7	44.68	9.884 5086	5346.4	4.36	11.48	22	57.1
		12	10	19	42.40	2.555	9	28	33.4	35.20	9.897 5403	5503.9	4.23	11.14	22	54.5
		13	10	21	0.81	3.976	9	40	39.3	25.23	9.910 8825	5605.5	4.10	10.80	22	52.4
		14	10	22	53.02	5.369	9	48	41.7	14.93	9.924 4040	5653.6	3.98	10.47	22	50.8
15		10	25	18.14	+ 6.714	+9	52	34.7	+ 4.47	9.937 9798	+5651.6	3.86	10.15	22	49.8	
16		10	28	14.79	7.994	9	52	16.1	- 6.02	9.951 4945	5603.2	3.74	9.84	22	49.3	
17		10	31	41.24	9.196	9	47	46.6	16.41	9.964 8420	5513.2	3.62	9.54	22	49.2	
18		10	35	35.47	10.307	9	39	10.4	26.56	9.977 9283	5386.3	3.51	9.26	22	49.6	
19		10	39	55.19	11.319	9	26	34.3	36.38	9.990 6711	5227.9	3.41	8.99	22	50.3	
20		10	44	37.97	+12.228	+9	10	7.6	- 45.76	0.003 0011	+5042.1	3.32	8.74	22	51.4	
21		10	49	41.28	13.031	8	50	1.9	54.62	0.014 8611	4837.2	3.23	8.50	22	52.8	
22		10	55	2.60	13.729	8	26	30.5	62.90	0.026 2072	4615.6	3.14	8.28	22	54.5	
23		11	0	39.43	14.324	7	59	48.0	70.53	0.037 0071	4382.9	3.07	8.08	22	56.4	
24		11	6	29.39	14.823	7	30	10.3	77.50	0.047 2396	4143.5	3.00	7.89	22	58.4	
25		11	12	30.23	+15.232	+6	57	53.5	- 83.78	0.056 8938	+3901.5	2.93	7.72	23	0.7	
26		11	18	39.90	15.560	6	23	14.1	89.39	0.065 9672	3660.1	2.87	7.56	23	3.0	
27		11	24	56.53	15.814	5	46	28.3	94.32	0.074 4652	3422.3	2.81	7.41	23	5.4	
28		11	31	18.47	16.004	5	7	52.0	98.60	0.082 3988	3190.2	2.76	7.28	23	7.9	
29		11	37	44.28	16.138	4	27	40.2	102.28	0.089 7841	2965.6	2.72	7.15	23	10.4	
30	11	44	12.72	+16.225	+3	46	7.3	-105.38	0.096 6405	+2749.7	2.68	7.04	23	13.0		
ct.	1	11	50	42.76	+16.272	+3	3	26.3	-107.95	0.102 9903	+2543.4	2.64	6.94	23	15.6	

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	M
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ' "	"			"	"	
Oct.	1	11 50 42.76	+16.272	+ 3 3 26.3	-107.95	0.102 9903	+2543.4	2.64	6.94	2
	2	11 57 13.54	16.287	2 19 49.5	110.03	0.108 8566	2346.9	2.60	6.85	2
	3	12 3 44.35	16.276	1 35 28.2	111.67	0.114 2636	2160.6	2.57	6.77	2
	4	12 10 14.65	16.245	0 50 32.3	112.92	0.119 2356	1984.4	2.54	6.69	2
	5	12 16 43.99	16.198	+ 0 5 11.0	113.80	0.123 7963	1817.8	2.51	6.62	2
	6	12 23 12.05	+16.139	- 0 40 27.5	-114.36	0.127 9688	+1600.8	2.49	6.55	2
	7	12 29 38.60	16.072	1 26 15.9	114.63	0.131 7753	1512.7	2.47	6.49	2
	8	12 36 3.49	16.001	2 12 7.7	114.65	0.135 2365	1373.1	2.45	6.44	2
	9	12 42 26.62	15.926	2 57 57.2	114.44	0.138 3722	1241.2	2.43	6.40	2
	10	12 48 47.94	15.851	3 43 39.1	114.02	0.141 2001	1116.7	2.41	6.36	2
	11	12 55 7.47	+15.777	- 4 29 8.9	-113.43	0.143 7377	+ 999.0	2.40	6.32	2
	12	13 1 25.24	15.705	5 14 22.6	112.68	0.146 0001	887.4	2.39	6.29	2
	13	13 7 41.31	15.636	5 59 16.4	111.78	0.148 0017	781.5	2.37	6.26	2
	14	13 13 55.78	15.571	6 43 47.2	110.76	0.149 7555	680.8	2.36	6.23	2
	15	13 20 8.75	15.511	7 27 52.1	109.62	0.151 2731	584.6	2.35	6.21	2
	16	13 26 20.33	+15.455	- 8 11 28.4	-108.39	0.152 5651	+ 492.8	2.35	6.19	2
	17	13 32 30.65	15.406	8 54 33.9	107.05	0.153 6415	404.8	2.34	6.17	2
	18	13 38 39.85	15.362	9 37 6.3	105.64	0.154 5106	320.0	2.34	6.16	2
	19	13 44 48.06	15.324	10 19 3.8	104.14	0.155 1797	238.2	2.34	6.16	2
	20	13 50 55.43	15.291	11 0 24.5	102.57	0.155 6559	159.0	2.34	6.15	.
	21	13 57 2.08	+15.264	-11 41 6.7	-100.94	0.155 9448	+ 82.1	2.33	6.14	
	22	14 3 8.17	15.244	12 21 9.0	99.24	0.156 0513	+ 7.0	2.33	6.14	
	23	14 9 13.84	15.229	13 0 29.7	97.48	0.155 9797	- 66.4	2.33	6.14	
	24	14 15 19.19	15.219	13 39 7.6	95.66	0.155 7337	138.5	2.34	6.15	
	25	14 21 24.37	15.214	14 17 1.2	93.79	0.155 3159	209.5	2.34	6.15	
	26	14 27 29.49	+15.214	-14 54 9.3	- 91.87	0.154 7286	- 279.8	2.34	6.16	
	27	14 33 34.66	15.218	15 30 30.5	89.89	0.153 9732	349.5	2.34	6.17	
	28	14 39 39.99	15.226	16 6 3.6	87.86	0.153 0510	419.0	2.35	6.19	
	29	14 45 45.56	15.239	16 40 47.3	85.77	0.151 9622	488.4	2.35	6.20	
	30	14 51 51.47	15.254	17 14 40.4	83.64	0.150 7068	557.8	2.36	6.22	
	31	14 57 57.78	+15.272	-17 47 41.6	- 81.45	0.149 2845	- 627.6	2.36	6.24	
Nov.	1	15 4 4.55	15.292	18 19 49.7	79.21	0.147 6937	698.1	2.37	6.26	
	2	15 10 11.84	15.315	18 51 3.4	76.92	0.145 9331	769.3	2.38	6.29	
	3	15 16 19.69	15.339	19 21 21.5	74.57	0.144 0004	841.5	2.40	6.32	
	4	15 22 28.11	15.363	19 50 42.6	72.17	0.141 8930	915.0	2.41	6.35	
	5	15 28 37.10	+15.386	-20 19 5.4	- 69.72	0.139 6074	- 989.9	2.42	6.38	
	6	15 34 46.66	15.410	20 46 28.6	67.20	0.137 1400	1066.5	2.43	6.42	
	7	15 40 56.76	15.431	21 12 50.7	64.63	0.134 4868	1144.9	2.45	6.46	
	8	15 47 7.34	15.450	21 38 10.5	62.00	0.131 6428	1225.5	2.46	6.50	
	9	15 53 18.31	15.465	22 2 26.4	59.31	0.128 6025	1308.4	2.48	6.54	
	10	15 59 29.60	+15.475	-22 25 37.0	- 56.56	0.125 3602	-1394.0	2.50	6.59	
	11	16 5 41.05	15.479	22 47 41.0	53.75	0.121 9092	1482.4	2.52	6.64	
	12	16 11 52.53	15.476	23 8 36.6	50.88	0.118 2424	1573.8	2.54	6.70	
	13	16 18 3.82	15.463	23 28 22.6	47.94	0.114 3520	1668.8	2.56	6.76	
	14	16 24 14.69	15.441	23 46 57.3	44.94	0.110 2293	1767.3	2.59	6.83	
	15	16 30 24.88	+15.406	-24 4 19.3	- 41.88	0.105 8656	-1869.8	2.62	6.90	
	16	16 36 34.07	+15.357	-24 20 26.9	- 38.75	0.101 2507	-1976.6	2.65	6.97	

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
Nov. 16	16 36 34.07	+15.357	-24 20 26.9	-38.75	0.101 2507	-1976.6	2.65	6.97	0 57.7
17	16 42 41.87	15.290	24 35 18.9	35.56	0.096 3741	2088.0	2.68	7.05	0 59.9
18	16 48 47.86	15.205	24 48 53.5	32.31	0.091 2247	2204.0	2.71	7.13	1 2.0
19	16 54 51.55	15.097	25 1 9.5	29.01	0.085 7905	2325.5	2.75	7.22	1 4.1
20	17 0 52.34	14.964	25 12 5.4	25.64	0.080 0582	2452.3	2.78	7.32	1 6.2
21	17 6 49.60	+14.802	-25 21 39.9	-22.22	0.074 0151	-2584.7	2.82	7.42	1 8.2
22	17 12 42.57	14.606	25 29 51.7	18.75	0.067 6468	2723.1	2.86	7.53	1 10.2
23	17 18 30.37	14.371	25 36 39.7	15.24	0.060 9392	2867.6	2.90	7.65	1 12.0
24	17 24 12.04	14.093	25 42 2.9	11.69	0.053 8775	3018.2	2.95	7.78	1 13.8
25	17 29 46.44	13.765	25 46 0.5	8.11	0.046 4470	3174.9	3.00	7.91	1 15.4
26	17 35 12.30	+13.380	-25 48 32.0	-4.51	0.038 6333	-3337.4	3.05	8.05	1 16.9
27	17 40 28.17	12.931	25 49 36.8	-0.89	0.030 4231	3505.3	3.11	8.20	1 18.2
28	17 45 32.43	12.411	25 49 14.8	+2.72	0.021 8041	3677.8	3.17	8.36	1 19.3
29	17 50 23.22	11.807	25 47 26.4	6.31	0.012 7668	3853.8	3.24	8.54	1 20.2
30	17 54 58.45	11.112	25 44 12.0	9.88	0.003 3043	4031.7	3.31	8.73	1 20.8
Dec. 1	17 59 15.79	+10.315	-25 39 32.5	+13.40	9.993 4149	-4209.1	3.39	8.93	1 21.1
2	18 3 12.67	9.404	25 33 29.2	16.86	9.983 1031	4383.2	3.47	9.15	1 21.1
3	18 6 46.20	8.368	25 26 3.9	20.24	9.972 3817	4549.5	3.56	9.38	1 20.7
4	18 9 53.27	7.197	25 17 18.5	23.52	9.961 2758	4702.9	3.65	9.62	1 19.9
5	18 12 30.49	5.880	25 7 15.7	26.70	9.949 8231	4837.1	3.75	9.88	1 18.5
6	18 14 34.32	+4.413	-24 55 58.0	+29.76	9.938 0799	-4943.4	3.85	10.15	1 16.6
7	18 16 1.07	2.792	24 43 28.4	32.69	9.926 1252	5011.8	3.96	10.43	1 14.1
8	18 16 47.14	+1.023	24 29 50.0	35.49	9.914 0629	5080.8	4.07	10.73	1 10.9
9	18 16 49.11	-0.879	24 15 5.8	38.17	9.902 0275	4987.1	4.18	11.03	1 6.9
10	18 16 4.09	2.887	23 59 19.0	40.71	9.890 1862	4866.7	4.29	11.33	1 2.2
11	18 14 30.01	-4.959	-23 42 32.7	+43.12	9.878 7398	-4655.6	4.41	11.63	0 56.7
12	18 12 6.04	7.033	23 24 50.7	45.35	9.867 9216	4341.6	4.52	11.92	0 50.4
13	18 8 52.99	9.035	23 6 17.7	47.35	9.857 9895	3916.0	4.63	12.20	0 43.2
14	18 4 53.67	10.873	22 47 0.4	49.02	9.849 2163	3376.1	4.72	12.45	0 35.3
15	18 0 13.19	12.449	22 27 8.4	50.21	9.841 8716	2727.4	4.80	12.66	0 26.7
16	17 54 58.99	-13.669	-22 6 55.6	+50.72	9.836 2000	-1985.0	4.86	12.83	0 17.6
17	17 49 20.57	14.456	21 46 40.7	50.35	9.832 3993	1173.2	4.91	12.94	{ 0 8.1 23 58.3
18	17 43 29.00	14.759	21 26 47.1	48.92	9.830 5989	-323.8	4.93	12.99	23 48.6
19	17 37 36.13	14.565	21 7 42.0	46.29	9.830 8458	+526.5	4.93	12.99	23 39.0
20	17 31 53.65	13.900	20 49 54.8	42.45	9.833 0982	1341.9	4.91	12.92	23 29.8
21	17 26 32.23	-12.822	-20 33 53.4	+37.49	9.837 2342	+2091.5	4.86	12.80	23 21.0
22	17 21 40.87	11.412	20 20 2.8	31.60	9.843 0652	2751.1	4.80	12.63	23 12.8
23	17 17 26.42	9.761	20 8 41.9	25.06	9.850 3560	3306.6	4.72	12.42	23 5.4
24	17 13 53.53	7.962	20 0 2.8	18.17	9.858 8496	3753.3	4.63	12.18	22 58.6
25	17 11 4.75	6.097	19 54 10.2	11.23	9.868 2864	4093.4	4.53	11.92	22 52.6
26	17 9 0.84	-4.233	-19 51 2.3	+4.49	9.878 4192	+4335.1	4.42	11.64	22 47.3
27	17 7 41.14	2.420	19 50 31.5	-1.84	9.889 0255	4489.9	4.31	11.36	22 42.7
28	17 7 3.96	-0.694	19 52 26.0	7.61	9.899 9115	4570.6	4.20	11.08	22 38.8
29	17 7 6.93	+0.922	19 56 31.4	12.72	9.910 9155	4590.3	4.10	10.80	22 35.5
30	17 7 47.27	2.419	20 2 31.2	17.15	9.921 9057	4561.0	4.00	10.53	22 32.8
31	17 9 2.02	+3.790	-20 10 8.8	-20.86	9.932 7779	+4493.7	3.90	10.27	22 30.6
32	17 10 48.22	. . .	-20 19 7.3	. . .	9.943 4525	. . . .	3.81	10.02	22 28.9

FOR

MEAN NOON.

FOR

MEAN NOON.

MERCURY, 1918.
FOR GREENWICH MEAN NOON.

FOR

MEAN NOON.

FOR

MEAN NOON.

Logarithm of
Radius Vector.

V

9.535 3549	+
9.542 1887	
9.549 0976	
9.556 0376	
9.562 9515	
9.569 7941	+
9.576 7447	
9.583 1166	
9.589 5364	
9.595 7634	
9.601 7795	+
9.607 5695	
9.613 1217	
9.618 4267	
9.623 4772	
9.628 2682	+
9.632 7958	
9.637 0574	
9.641 0511	
9.644 7764	
9.648 2330	+
9.651 4208	
9.654 3404	
9.656 9928	
9.659 3787	
9.661 4992	+
9.663 3552	
9.664 8478	
9.666 2777	
9.667 3459	
9.668 1530	+
9.668 6906	
9.669 9056	+
9.669 0123	-
9.668 7787	
9.668 2848	-
9.667 5305	
9.666 5152	
9.665 2384	
9.663 0091	
9.661 8963	-
9.659 8295	
9.657 4973	
9.654 8960	
9.652 0335	
9.648 9000	-
9.645 4979	-

FOR

MEAN NOON.

VENUS, 1918.
GREENWICH MEAN TIME.

VENUS, 1918.
GREENWICH MEAN TIME.

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VENUS, 1918.
GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
May	17	0 44	42.50	+10.219	+ 2 54	49.7		+57.79	9.952 1094	+1573.3	9.55	9.83	21 7.4
	18	0 48	48.09	10.246	3 17	59.1		57.99	9.955 8657	1557.0	9.46	9.74	21 7.5
	19	0 52	54.33	10.274	3 41	13.2		58.18	9.959 5832	1541.0	9.39	9.66	21 7.7
	20	0 57	1.23	10.301	4 4	31.3		58.32	9.963 2625	1525.1	9.31	9.58	21 7.9
	21	1 1	8.80	10.330	4 27	52.6		58.45	9.966 9040	1509.5	9.23	9.50	21 8.1
	22	1 5	17.06	+10.359	+ 4 51	16.6		+58.55	9.970 5082	+1494.0	9.15	9.42	21 8.3
	23	1 9	26.03	10.389	5 14	42.6		58.61	9.974 0754	1478.7	9.07	9.34	21 8.5
	24	1 13	35.72	10.419	5 38	9.9		58.63	9.977 6061	1463.6	9.01	9.27	21 8.7
	25	1 17	46.15	10.450	6 1	37.8		58.66	9.981 1008	1448.6	8.93	9.19	21 9.0
	26	1 21	57.34	10.482	6 25	5.6		58.65	9.984 5596	1433.8	8.86	9.12	21 9.2
	27	1 26	9.32	+10.516	+ 6 48	32.6		+58.60	9.987 9831	+1419.1	8.79	9.05	21 9.5
	28	1 30	22.10	10.549	7 11	58.1		58.52	9.991 3714	1404.5	8.72	8.98	21 9.8
	29	1 34	35.70	10.584	7 35	21.5		58.42	9.994 7248	1390.0	8.66	8.91	21 10.1
	30	1 38	50.14	10.619	7 58	42.0		58.29	9.998 0435	1375.6	8.59	8.84	21 10.4
	31	1 43	5.43	10.655	8 21	59.0		58.12	0.001 3278	1361.3	8.52	8.77	21 10.7
June	1	1 47	21.59	+10.692	+ 8 45	11.7		+57.93	0.004 5779	+1347.1	8.46	8.71	21 11.0
	2	1 51	38.64	10.729	9 8	19.4		57.71	0.007 7941	1333.1	8.39	8.64	21 11.4
	3	1 55	56.58	10.767	9 31	21.4		57.45	0.010 9767	1319.1	8.34	8.58	21 11.8
	4	2 0	15.45	10.806	9 54	16.9		57.17	0.014 1260	1305.3	8.28	8.52	21 12.1
	5	2 4	35.25	10.845	10 17	5.3		56.86	0.017 2422	1291.6	8.22	8.46	21 12.5
	6	2 8	56.00	+10.885	+10 39	45.8		+56.51	0.020 3257	+1278.0	8.16	8.40	21 13.0
	7	2 13	17.71	10.925	11 2	17.6		56.14	0.023 3768	1264.6	8.10	8.34	21 13.4
	8	2 17	40.39	10.965	11 24	40.1		55.73	0.026 3958	1251.3	8.04	8.28	21 13.8
	9	2 22	4.05	11.007	11 46	52.5		55.30	0.029 3833	1238.2	7.99	8.22	21 14.3
	10	2 26	28.72	11.049	12 8	54.1		54.83	0.032 3395	1225.3	7.94	8.17	21 14.8
	11	2 30	54.39	+11.091	+12 30	44.3		+54.34	0.035 2650	+1212.6	7.88	8.11	21 15.3
	12	2 35	21.10	11.135	12 52	22.3		53.82	0.038 1602	1200.1	7.83	8.06	21 15.8
	13	2 39	48.86	11.178	13 13	47.5		53.27	0.041 0254	1187.6	7.78	8.01	21 16.3
	14	2 44	17.67	11.223	13 34	59.0		52.69	0.043 8609	1175.4	7.72	7.95	21 16.9
	15	2 48	47.56	11.268	13 55	56.3		52.08	0.046 6673	1163.3	7.68	7.90	21 17.5
	16	2 53	18.54	+11.314	+14 16	38.6		+51.44	0.049 4449	+1151.4	7.63	7.85	21 18.1
	17	2 57	50.62	11.360	14 37	5.3		50.78	0.052 1939	1139.5	7.58	7.80	21 18.7
	18	3 2	23.82	11.407	14 57	15.6		50.08	0.054 9148	1127.9	7.54	7.76	21 19.3
	19	3 6	58.14	11.454	15 17	8.8		49.35	0.057 6078	1116.3	7.49	7.71	21 19.9
	20	3 11	33.61	11.502	15 36	44.3		48.60	0.060 2732	1104.9	7.44	7.66	21 20.6
	21	3 16	10.22	+11.550	+15 56	1.3		+47.81	0.062 9112	+1093.5	7.39	7.61	21 21.3
	22	3 20	48.00	11.599	16 14	59.2		47.00	0.065 5222	1082.3	7.36	7.57	21 22.0
	23	3 25	26.95	11.648	16 33	37.3		46.17	0.068 1064	1071.2	7.31	7.52	21 22.7
	24	3 30	7.08	11.697	16 51	54.9		45.29	0.070 6640	1060.2	7.27	7.48	21 23.5
	25	3 34	48.40	11.746	17 9	51.2		44.39	0.073 1952	1049.2	7.23	7.44	21 24.2
	26	3 39	30.91	+11.796	+17 27	25.6		+43.47	0.075 7000	+1038.2	7.18	7.39	21 25.0
	27	3 44	14.61	11.846	17 44	37.4		42.51	0.078 1787	1027.4	7.14	7.35	21 25.8
	28	3 48	59.50	11.895	18 1	26.0		41.53	0.080 6314	1016.5	7 10	7 31	21 26.7
	29	3 53	45.58	11.945	18 17	50.6		40.51	0.083 0581	1005.8	7.06	7.27	21 27.5
	30	3 58	32.84	11.994	18 33	50.5		39.47	0.085 4590	995.0	7.02	7.23	21 28.4
July	1	4 3	21.27	+12.042	+18 49	25.1		+38.41	0.087 8341	+ 984.3	6.99	7.19	21 29.2
	2	4 8	10.88	+12.091	+19 4	33.8		+37.31	0.090 1836	+ 973.7	6.95	7.15	21 30.1

VENUS, 1918.
GREENWICH MEAN TIME.

VENUS, 1918.
GREENWICH MEAN TIME.

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GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	T M
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ' "	"			"	"	
Oct.	1	11 39 48.88	+11.469	+ 3 45 45.8	-73.14	0.217 8079	+263.8	5.18	5.33	2
	2	11 44 24.01	11.459	3 16 26.7	73.44	0.218 4338	257.8	5.17	5.32	2
	3	11 48 58.93	11.451	2 47 0.8	73.71	0.219 0454	251.9	5.16	5.31	2
	4	11 53 33.68	11.445	2 17 28.8	73.95	0.219 6430	246.1	5.16	5.31	2
	5	11 58 8.30	11.440	1 47 51.5	74.16	0.220 2265	240.2	5.15	5.30	2
	6	12 2 42.83	+11.437	+ 1 18 9.5	-74.34	0.220 7961	+234.5	5.14	5.29	2
	7	12 7 17.30	11.436	0 48 23.7	74.48	0.221 3519	228.7	5.14	5.29	2
	8	12 11 51.75	11.435	+ 0 18 34.8	74.59	0.221 8939	223.0	5.13	5.28	2
	9	12 16 26.21	11.437	- 0 11 16.5	74.68	0.222 4223	217.4	5.12	5.27	2
	10	12 21 0.74	11.440	0 41 9.4	74.73	0.222 9373	211.8	5.12	5.27	2
	11	12 25 35.36	+11.445	- 1 11 3.2	-74.75	0.223 4389	+206.2	5.11	5.26	2
	12	12 30 10.12	11.452	1 40 57.2	74.74	0.223 9273	200.8	5.11	5.26	2
	13	12 34 45.05	11.460	2 10 50.6	74.70	0.224 4026	195.3	5.10	5.25	2
	14	12 39 20.20	11.470	2 40 42.7	74.63	0.224 8650	190.0	5.09	5.24	2
	15	12 43 55.61	11.481	3 10 32.7	74.53	0.225 3146	184.7	5.09	5.24	2
	16	12 48 31.31	+11.494	- 3 40 19.9	-74.40	0.225 7517	+179.5	5.08	5.23	2
	17	12 53 7.35	11.509	4 10 3.5	74.23	0.226 1762	174.3	5.08	5.23	2
	18	12 57 43.77	11.526	4 39 42.8	74.04	0.226 5884	169.2	5.07	5.22	2
	19	13 2 20.62	11.545	5 9 17.1	73.81	0.226 9884	164.1	5.07	5.22	2
	20	13 6 57.94	11.565	5 38 45.5	73.55	0.227 3762	159.0	5.06	5.21	2
	21	13 11 35.76	+11.587	- 6 8 7.4	-73.27	0.227 7518	+154.0	5.06	5.21	2
	22	13 16 14.13	11.611	6 37 22.0	72.95	0.228 1155	149.0	5.05	5.20	2
	23	13 20 53.10	11.636	7 6 28.6	72.60	0.228 4670	144.0	5.05	5.20	2
	24	13 25 32.69	11.663	7 35 26.3	72.21	0.228 8065	138.9	5.05	5.20	2
	25	13 30 12.95	11.692	8 4 14.3	71.79	0.229 1338	133.9	5.04	5.19	2
	26	13 34 53.92	+11.722	- 8 32 52.0	-71.34	0.229 4491	+128.9	5.04	5.19	2
	27	13 39 35.64	11.754	9 1 18.4	70.86	0.229 7523	123.8	5.03	5.18	2
	28	13 44 18.13	11.787	9 29 32.9	70.34	0.230 0434	118.8	5.03	5.18	2
	29	13 49 1.43	11.822	9 57 34.6	69.79	0.230 3225	113.8	5.03	5.18	2
	30	13 53 45.58	11.858	10 25 22.7	69.21	0.230 5895	108.8	5.02	5.17	2
Nov.	31	13 58 30.61	+11.895	-10 52 56.3	-68.59	0.230 8446	+103.8	5.02	5.17	2
	1	14 3 16.55	11.933	11 20 14.8	67.94	0.231 0876	98.8	5.02	5.17	2
	2	14 8 3.42	11.973	11 47 17.2	67.26	0.231 3186	93.8	5.02	5.17	2
	3	14 12 51.26	12.014	12 14 2.8	66.54	0.231 5377	88.8	5.01	5.16	2
	4	14 17 40.09	12.056	12 40 30.8	65.79	0.231 7449	83.9	5.01	5.16	2
	5	14 22 29.94	+12.099	-13 6 40.4	-65.00	0.231 9404	+ 79.0	5.01	5.16	2
	6	14 27 20.83	12.143	13 32 30.7	64.19	0.232 1241	74.1	5.01	5.16	2
	7	14 32 12.79	12.188	13 58 1.0	63.33	0.232 2962	69.3	5.00	5.15	2
	8	14 37 5.84	12.233	14 23 10.3	62.44	0.232 4569	64.6	5.00	5.15	2
	9	14 41 59.99	12.280	14 47 58.0	61.52	0.232 6061	59.8	5.00	5.15	2
	10	14 46 55.27	+12.327	-15 12 23.2	-60.57	0.232 7440	+ 55.1	5.00	5.15	2
	11	14 51 51.69	12.375	15 36 25.1	59.59	0.232 8707	50.5	5.00	5.15	2
	12	14 56 49.27	12.424	16 0 3.0	58.56	0.232 9864	45.9	5.00	5.15	2
	13	15 1 48.03	12.473	16 23 15.9	57.51	0.233 0911	41.3	4.99	5.14	2
	14	15 6 47.97	12.522	16 46 3.2	56.42	0.233 1849	36.9	4.99	5.14	2
	15	15 11 49.11	+12.572	-17 8 24.0	-55.30	0.233 2680	+ 32.4	4.99	5.14	2
	16	15 16 51.45	+12.623	-17 30 17.5	-54.15	0.233 3404	+ 28.0	4.99	5.14	2

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Paral- lax.	Transit, Meridian of Greenwich.
	Noon.				Noon.								
	h	m	s	s	°	'	"	"			"	"	h m
ov. 16	15	16	51.45	+12.623	-17	30	17.5	-54.15	0.233 3404	+ 28.0	4.99	5.14	23 39.0
17	15	21	55.01	12.674	17	51	43.0	52.97	0.233 4024	23.6	4.99	5.14	23 40.1
18	15	26	59.79	12.725	18	12	39.7	51.75	0.233 4539	19.3	4.99	5.14	23 41.3
19	15	32	5.80	12.776	18	33	6.8	50.50	0.233 4952	15.0	4.99	5.14	23 42.5
20	15	37	13.04	12.827	18	53	3.6	49.22	0.233 5261	10.7	4.99	5.14	23 43.7
21	15	42	21.50	+12.878	-19	12	29.3	-47.91	0.233 5467	+ 6.4	4.99	5.14	23 44.9
22	15	47	31.19	12.929	19	31	23.1	46.57	0.233 5569	+ 2.1	4.99	5.14	23 46.1
23	15	52	42.10	12.980	19	49	44.3	45.19	0.233 5567	- 2.2	4.99	5.14	23 47.4
24	15	57	54.21	13.030	20	7	32.2	43.79	0.233 5461	6.6	4.99	5.14	23 48.7
25	16	3	7.51	13.079	20	24	46.1	42.36	0.233 5250	10.9	4.99	5.14	23 50.0
26	16	8	21.98	+13.127	-20	41	25.2	-40.90	0.233 4936	- 15.3	4.99	5.14	23 51.3
27	16	13	37.61	13.175	20	57	28.9	39.40	0.233 4517	19.6	4.99	5.14	23 52.6
28	16	18	54.37	13.223	21	12	56.4	37.89	0.233 3993	24.0	4.99	5.14	23 54.0
29	16	24	12.23	13.267	21	27	47.2	36.34	0.233 3363	28.4	4.99	5.14	23 55.3
30	16	29	31.16	13.311	21	42	0.5	34.77	0.233 2628	32.8	4.99	5.14	23 56.7
oc. 1	16	34	51.14	+13.354	-21	55	35.8	-33.17	0.233 1787	- 37.2	4.99	5.14	23 58.1
2	16	40	12.12	13.395	22	8	32.4	31.54	0.233 0840	41.6	4.99	5.14	23 59.6
3	16	45	34.08	13.434	22	20	49.7	29.90	0.232 9788	46.0	5.00	5.15	...
4	16	50	56.96	13.472	22	32	27.3	28.23	0.232 8630	50.4	5.00	5.15	0 1.0
5	16	56	20.73	13.508	22	43	24.6	26.54	0.232 7368	54.8	5.00	5.15	0 2.5
6	17	1	45.34	+13.542	-22	53	41.0	-24.83	0.232 6001	- 59.1	5.00	5.15	0 3.9
7	17	7	10.73	13.574	23	3	16.1	23.09	0.232 4530	63.5	5.00	5.15	0 5.4
8	17	12	36.86	13.604	23	12	9.4	21.35	0.232 2955	67.8	5.00	5.15	0 6.9
9	17	18	3.68	13.631	23	20	20.6	19.58	0.232 1277	72.0	5.01	5.16	0 8.4
10	17	23	31.12	13.656	23	27	49.2	17.80	0.231 9497	76.3	5.01	5.16	0 9.9
11	17	28	59.14	+13.679	-23	34	34.8	-16.00	0.231 7616	- 80.5	5.01	5.16	0 11.4
12	17	34	27.67	13.699	23	40	37.2	14.19	0.231 5634	84.7	5.01	5.16	0 13.0
13	17	39	56.66	13.717	23	45	56.0	12.87	0.231 3551	88.8	5.02	5.17	0 14.5
14	17	45	26.05	13.732	23	50	31.0	10.54	0.231 1370	92.9	5.02	5.17	0 16.1
15	17	50	55.78	13.745	23	54	22.0	8.70	0.230 9090	97.0	5.02	5.17	0 17.6
16	17	56	25.79	+13.755	-23	57	28.6	- 6.85	0.230 6713	-101.0	5.02	5.17	0 19.2
17	18	1	56.02	13.763	23	59	50.8	5.00	0.230 4240	105.1	5.03	5.18	0 20.7
18	18	7	26.40	13.768	24	1	28.5	3.14	0.230 1670	109.1	5.03	5.18	0 22.3
19	18	12	56.87	13.771	24	2	21.4	- 1.27	0.229 9003	113.1	5.03	5.18	0 23.9
20	18	18	27.38	13.771	24	2	29.6	+ 0.59	0.229 6240	117.1	5.04	5.19	0 25.5
21	18	23	57.86	+13.768	-24	1	53.0	+ 2.46	0.229 3380	-121.2	5.04	5.19	0 27.0
22	18	29	28.23	13.763	24	0	31.5	4.33	0.229 0422	125.3	5.04	5.19	0 28.6
23	18	34	58.45	13.755	23	58	25.3	6.19	0.228 7365	129.4	5.05	5.20	0 30.1
24	18	40	28.44	13.744	23	55	34.5	8.05	0.228 4210	133.5	5.05	5.20	0 31.7
25	18	45	58.15	13.731	23	51	59.0	9.90	0.228 0956	137.7	5.05	5.20	0 33.3
26	18	51	27.50	+13.715	-23	47	39.2	+11.75	0.227 7601	-141.9	5.06	5.21	0 34.8
27	18	56	56.44	13.696	23	42	35.0	13.59	0.227 4145	146.1	5.06	5.21	0 36.3
28	19	2	24.90	13.675	23	36	46.9	15.42	0.227 0587	150.4	5.07	5.22	0 37.9
29	19	7	52.83	13.651	23	30	14.9	17.24	0.226 6926	154.7	5.07	5.22	0 39.4
30	19	13	20.15	13.625	23	22	59.5	19.05	0.226 3163	159.0	5.08	5.23	0 40.9
31	19	18	46.82	+13.597	-23	15	0.8	+20.84	0.225 9295	-163.3	5.08	5.23	0 42.4
32	19	24	12.78	+13.566	-23	6	19.3	+22.62	0.225 5322	-167.7	5.09	5.24	0 43.9

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	° ' "	' "	° ' "	' "		
Jan.	0	74 47 7.4	1 36 42.3	−0 7.3	−0 4 7.4	+5 44.0	9.857 6596	−687
	2	78 0 35.5	1 36 45.9	+0 13.1	+0 7 20.9	5 44.0	9.857 5250	659
	4	81 14 10.8	1 36 49.4	0 33.3	0 18 48.2	5 43.0	9.857 3961	630
	6	84 27 53.3	1 36 53.0	0 53.1	0 30 12.3	5 40.9	9.857 2732	598
	8	87 41 42.9	1 36 56.6	1 12.3	0 41 31.0	5 37.7	9.857 1569	565
	10	90 55 39.5	1 37 0.0	+1 30.5	+0 52 42.2	+5 33.3	9.857 0474	−530
	12	94 9 42.9	1 37 3.4	1 47.6	1 3 43.6	5 27.9	9.856 9452	492
	14	97 23 52.9	1 37 6.6	2 3.3	1 14 33.1	5 21.4	9.856 8505	454
	16	100 38 9.4	1 37 9.8	2 17.5	1 25 8.6	5 13.9	9.856 7637	414
	18	103 52 32.1	1 37 12.9	2 29.9	1 35 28.1	5 5.4	9.856 6851	372
	20	107 7 0.8	1 37 15.8	+2 40.4	+1 45 29.5	+4 55.9	9.856 6149	−330
	22	110 21 35.0	1 37 18.4	2 48.9	1 55 10.9	4 45.3	9.856 5533	286
	24	113 36 14.5	1 37 20.9	2 55.2	2 4 30.2	4 33.8	9.856 5007	241
	26	116 50 58.8	1 37 23.3	2 59.2	2 13 25.7	4 21.5	9.856 4570	196
	28	120 5 47.5	1 37 25.4	3 1.0	2 21 55.6	4 8.3	9.856 4225	149
	30	123 20 40.2	1 37 27.2	+3 0.4	+2 29 58.3	+3 54.2	9.856 3974	−102
Feb.	1	126 35 36.2	1 37 28.8	2 57.5	2 37 32.1	3 39.4	9.856 3817	55
	3	129 50 35.1	1 37 30.1	2 52.3	2 44 35.6	3 24.0	9.856 3754	− 8
	5	133 5 36.4	1 37 31.1	2 44.9	2 51 7.4	3 7.8	9.856 3786	+ 40
	7	136 20 39.3	1 37 31.8	2 35.4	2 57 6.2	2 51.0	9.856 3912	87
	9	139 35 43.2	1 37 32.1	+2 23.9	+3 2 30.8	+2 33.6	9.856 4133	+134
	11	142 50 47.6	1 37 32.2	2 10.6	3 7 20.2	2 15.8	9.856 4447	180
	13	146 5 51.8	1 37 31.9	1 55.5	3 11 33.5	1 57.5	9.856 4854	226
	15	149 20 55.0	1 37 31.2	1 39.0	3 15 9.8	1 38.8	9.856 5351	271
	17	152 35 56.5	1 37 30.2	1 21.2	3 18 8.4	1 19.8	9.856 5937	315
	19	155 50 55.7	1 37 28.9	+1 2.4	+3 20 28.9	+1 0.6	9.856 6610	+358
	21	159 5 51.7	1 37 27.1	0 42.8	3 22 10.7	0 41.2	9.856 7369	400
	23	162 20 44.0	1 37 25.1	0 22.6	3 23 13.5	0 21.6	9.856 8210	441
	25	165 35 31.9	1 37 22.7	+0 2.2	3 23 37.3	+0 2.1	9.856 9131	480
	27	168 50 14.6	1 37 20.0	−0 18.2	3 23 22.0	−0 17.4	9.857 0129	518
Mar.	1	172 4 51.5	1 37 16.9	−0 38.4	+3 22 27.7	−0 36.9	9.857 1201	+554
	3	175 19 22.0	1 37 13.5	0 58.2	3 20 54.6	0 56.2	9.857 2342	588
	5	178 33 45.4	1 37 9.8	1 17.1	3 18 43.1	1 15.3	9.857 3550	620
	7	181 48 1.1	1 37 5.9	1 35.1	3 15 53.7	1 34.1	9.857 4820	650
	9	185 2 8.7	1 37 1.7	1 51.8	3 12 26.9	1 52.6	9.857 6148	678
	11	188 16 7.6	1 36 57.2	−2 7.1	+3 8 23.6	−2 10.6	9.857 7529	+703
	13	191 29 57.4	1 36 52.5	2 20.8	3 3 44.6	2 28.3	9.857 8960	727
	15	194 43 37.6	1 36 47.7	2 32.7	2 58 30.9	2 45.4	9.858 0435	748
	17	197 57 7.9	1 36 42.6	2 42.7	2 52 43.5	3 1.9	9.858 1950	767
	19	201 10 27.8	1 36 37.4	2 50.6	2 46 23.6	3 17.9	9.858 3500	783
	21	204 23 37.3	1 36 32.1	−2 56.3	+2 39 32.4	−3 33.2	9.858 5080	+797
	23	207 36 36.1	1 36 26.7	2 59.8	2 32 11.5	3 47.7	9.858 6685	808
	25	210 49 24.0	1 36 21.2	3 1.0	2 24 22.2	4 1.5	9.858 8310	816
	27	214 2 0.9	1 36 15.7	3 0.0	2 16 6.0	4 14.5	9.858 9949	822
	29	217 14 26.8	1 36 10.2	2 56.7	2 7 24.7	4 26.7	9.859 1598	826
	31	220 26 41.7	1 36 4.7	−2 51.2	+1 58 19.9	−4 38.0	9.859 3252	+827
Apr.	2	223 38 45.6	1 35 59.3	−2 43.6	+1 48 53.4	−4 48.4	9.859 4904	+825

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	° ' "	' "	° ' "	' "		
r.	2	223 38 45.6	1 35 59.3	-2 43.6	+1 48 53.4	-4 48.4	9.859 4904	+825
	4	226 50 38.9	1 35 54.0	2 33.9	1 39 6.9	4 57.9	9.859 6550	821
	6	230 2 21.5	1 35 48.7	2 22.4	1 29 2.4	5 6.4	9.859 8186	814
	8	233 13 53.7	1 35 43.6	2 9.0	1 18 41.8	5 14.0	9.859 9805	806
	10	236 25 15.8	1 35 38.6	1 54.1	1 8 7.0	5 20.6	9.860 1403	798
	12	239 36 28.1	1 35 33.8	-1 37.8	+0 57 20.0	-5 26.2	9.860 2975	+779
	14	242 47 31.0	1 35 29.1	1 20.3	0 46 22.9	5 30.8	9.860 4516	762
	16	245 58 24.8	1 35 24.7	1 1.8	0 35 17.6	5 34.3	9.860 6022	743
	18	249 9 10.1	1 35 20.6	0 42.6	0 24 6.3	5 36.8	9.860 7487	722
	20	252 19 47.2	1 35 16.6	0 22.8	0 12 50.9	5 38.3	9.860 8908	698
	22	255 30 16.6	1 35 12.9	-0 2.8	+0 1 33.7	-5 38.8	9.861 0279	+673
	24	258 40 39.0	1 35 9.5	+0 17.3	-0 9 43.5	5 38.2	9.861 1598	645
	26	261 50 54.8	1 35 6.4	0 37.1	0 20 58.4	5 36.6	9.861 2859	616
	28	265 1 4.6	1 35 3.5	0 56.4	0 32 9.1	5 34.0	9.861 4080	585
	30	268 11 8.9	1 35 0.9	1 15.1	0 43 13.5	5 30.3	9.861 5196	551
y	2	271 21 8.3	1 34 58.6	+1 32.8	-0 54 9.7	-5 25.7	9.861 6264	+516
	4	274 31 3.5	1 34 56.6	1 49.4	1 4 55.7	5 20.1	9.861 7260	480
	6	277 40 54.9	1 34 54.9	2 4.6	1 15 29.5	5 13.5	9.861 8183	443
	8	280 50 43.3	1 34 53.5	2 18.4	1 25 49.3	5 6.0	9.861 9030	403
	10	284 0 29.1	1 34 52.4	2 30.4	1 35 53.1	4 57.6	9.861 9796	363
	12	287 10 12.9	1 34 51.5	+2 40.6	-1 45 39.3	-4 48.4	9.862 0481	+322
	14	290 19 55.3	1 34 50.9	2 48.8	1 55 6.0	4 38.2	9.862 1083	280
	16	293 29 36.8	1 34 50.6	2 55.0	2 4 11.5	4 27.2	9.862 1599	236
	18	296 39 18.0	1 34 50.6	2 59.0	2 12 54.2	4 15.4	9.862 2028	192
	20	299 48 59.3	1 34 50.8	3 0.9	2 21 12.6	4 2.8	9.862 2368	148
	22	302 58 41.3	1 34 51.2	+3 0.6	-2 29 5.1	-3 49.6	9.862 2620	+104
	24	306 8 24.4	1 34 51.9	2 58.0	2 36 30.5	3 35.6	9.862 2782	58
	26	309 18 9.1	1 34 52.8	2 53.3	2 43 27.2	3 21.0	9.862 2853	+ 13
	28	312 27 55.7	1 34 53.9	2 46.6	2 49 54.2	3 5.8	9.862 2833	- 33
	30	315 37 44.7	1 34 55.1	2 37.7	2 55 50.1	2 50.0	9.862 2722	78
ne	1	318 47 36.4	1 34 56.6	+2 26.9	-3 1 13.9	-2 33.7	9.862 2521	-123
	3	321 57 31.2	1 34 58.2	2 14.4	3 6 4.7	2 17.0	9.862 2231	168
	5	325 7 29.3	1 35 0.0	2 0.2	3 10 21.5	1 59.8	9.862 1851	212
	7	328 17 31.2	1 35 1.9	1 44.6	3 14 3.5	1 42.2	9.862 1384	255
	9	331 27 37.0	1 35 4.0	1 27.6	3 17 10.1	1 24.4	9.862 0830	298
	11	334 37 47.1	1 35 6.1	+1 9.6	-3 19 40.7	-1 6.2	9.862 0192	-340
	13	337 48 1.6	1 35 8.4	0 50.7	3 21 34.7	0 47.8	9.861 9471	381
	15	340 58 20.7	1 35 10.7	0 31.2	3 22 51.8	0 29.3	9.861 8609	421
	17	344 8 44.5	1 35 13.2	+0 11.4	3 23 31.7	-0 10.6	9.861 7788	460
	19	347 19 13.4	1 35 15.7	-0 8.7	3 23 34.2	+0 8.1	9.861 6831	497
	21	350 29 47.3	1 35 18.3	-0 28.6	-3 22 59.3	+0 26.8	9.861 5802	-532
	23	353 40 26.6	1 35 21.0	0 48.2	3 21 46.9	0 45.5	9.861 4703	566
	25	356 51 11.2	1 35 23.7	1 7.2	3 19 57.4	1 4.0	9.861 3537	599
	27	0 2 1.3	1 35 26.4	1 25.4	3 17 31.0	1 22.4	9.861 2307	630
	29	3 12 57.0	1 35 29.2	1 42.6	3 14 28.0	1 40.6	9.861 1018	659
	1	6 23 58.3	1 35 32.1	-1 58.5	-3 10 49.0	+1 58.4	9.860 9674	-685
	3	9 35 5.5	1 35 35.0	-2 12.9	-3 6 34.6	+2 16.0	9.860 8279	-710

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Val D
		° ' "	° ' "	' "	° ' "	' "		
July	1	6 23 58.3	1 35 32.1	-1 58.5	-3 10 49.0	+1 58.4	9.860 9674	-
	3	9 35 5.5	1 35 35.0	2 12.9	3 6 34.6	2 16.0	9.860 8279	
	5	12 46 18.5	1 35 38.0	2 25.7	3 1 45.4	2 33.1	9.860 6836	
	7	15 57 37.4	1 35 41.0	2 36.8	2 56 22.4	2 49.8	9.860 5350	
	9	19 9 2.4	1 35 44.0	2 45.8	2 50 26.3	3 6.1	9.860 3825	
	11	22 20 33.5	1 35 47.1	-2 52.9	-2 43 58.3	+3 21.8	9.860 2267	-
	13	25 32 10.7	1 35 50.2	2 57.8	2 36 59.6	3 36.8	9.860 0680	
	15	28 43 54.3	1 35 53.4	3 0.5	2 29 31.3	3 51.3	9.859 9069	
	17	31 55 44.2	1 35 56.5	3 0.9	2 21 34.8	4 5.1	9.859 7438	
	19	35 7 40.5	1 35 59.8	2 59.1	2 13 11.5	4 18.1	9.859 5794	
	21	38 19 43.3	1 36 3.1	-2 55.1	-2 4 22.9	+4 30.3	9.859 4141	-
	23	41 31 52.8	1 36 6.4	2 48.9	1 55 10.7	4 41.8	9.859 2484	
Aug.	25	44 44 8.9	1 36 9.7	2 40.5	1 45 36.4	4 52.4	9.859 0829	
	27	47 56 31.8	1 36 13.2	2 30.2	1 35 41.8	5 2.0	9.858 9180	
	29	51 9 1.6	1 36 16.6	2 17.9	1 25 28.9	5 10.8	9.858 7543	
	31	54 21 38.2	1 36 20.1	-2 3.9	-1 14 59.4	+5 18.6	9.858 5924	-
	2	57 34 22.0	1 36 23.7	1 48.4	1 4 15.2	5 25.4	9.858 4326	
	4	60 47 12.8	1 36 27.2	1 31.4	0 53 18.5	5 31.1	9.858 2756	
	6	64 0 10.7	1 36 30.7	1 13.4	0 42 11.3	5 35.9	9.858 1218	
	8	67 13 15.7	1 36 34.3	0 54.3	0 30 55.6	5 39.6	9.857 9718	
	10	70 26 28.0	1 36 38.0	-0 34.6	-0 19 33.6	+5 42.2	9.857 8259	-
	12	73 39 47.6	1 36 41.6	-0 14.4	-0 8 7.4	5 43.8	9.857 6848	
	14	76 53 14.4	1 36 45.2	+0 6.0	+0 3 20.7	5 44.2	9.857 5488	
	16	80 6 48.4	1 36 48.8	0 26.3	0 14 48.6	5 43.6	9.857 4183	
Sept.	18	83 20 29.6	1 36 52.4	0 46.2	0 26 14.2	5 41.8	9.857 2938	
	20	86 34 17.8	1 36 55.9	+1 5.7	+0 37 35.1	+5 38.9	9.857 1758	-
	22	89 48 13.1	1 36 59.3	1 24.2	0 48 49.2	5 35.0	9.857 0645	
	24	93 2 15.1	1 37 2.7	1 41.8	0 59 54.3	5 30.0	9.856 9605	
	26	96 16 23.8	1 37 6.0	1 58.0	1 10 48.3	5 23.8	9.856 8639	
	28	99 30 39.0	1 37 9.2	2 12.7	1 21 29.0	5 16.7	9.856 7752	
	30	102 45 0.4	1 37 12.2	+2 25.8	+1 31 54.3	+5 8.5	9.856 6945	-
	1	105 59 27.9	1 37 15.2	2 37.0	1 42 2.2	4 59.2	9.856 6222	
	3	109 14 1.0	1 37 17.9	2 46.2	1 51 50.7	4 49.1	9.856 5585	
	5	112 28 39.4	1 37 20.5	2 53.2	2 1 18.0	4 38.0	9.856 5036	
	7	115 43 22.8	1 37 22.8	2 58.0	2 10 22.0	4 25.9	9.856 4578	
	9	118 58 10.6	1 37 24.9	+3 0.6	+2 19 1.0	+4 13.0	9.856 4211	-
Oct.	11	122 13 2.4	1 37 26.3	3 0.8	2 27 13.4	3 59.2	9.856 3937	
	13	125 27 57.8	1 37 28.5	2 58.8	2 34 57.4	3 44.7	9.856 3756	
	15	128 42 56.2	1 37 29.9	2 54.4	2 42 11.7	3 29.4	9.856 3670	-
	17	131 57 57.1	1 37 31.0	2 47.7	2 48 54.6	3 13.4	9.856 3679	+
	19	135 12 59.9	1 37 31.7	+2 39.0	+2 55 5.1	+2 56.9	9.856 3782	+
	21	138 28 3.8	1 37 32.1	2 28.2	3 0 41.7	2 39.7	9.856 3979	
	23	141 43 8.3	1 37 32.3	2 15.4	3 5 43.5	2 22.0	9.856 4269	
	25	144 58 12.8	1 37 32.1	2 1.0	3 10 9.4	2 3.9	9.856 4652	
	27	148 13 16.6	1 37 31.6	1 44.9	3 13 58.7	1 45.3	9.856 5126	
	29	151 28 18.9	1 37 30.7	+1 27.6	+3 17 10.5	+1 26.4	9.856 5690	+
	1	154 43 19.0	1 37 29.4	+1 9.1	+3 19 44.3	+1 7.3	9.856 6341	+

FOR GREENWICH MEAN NOON.

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	° ' "	° ' "	' "	° ' "	' "				
t.	1	154 43 19.0	1 37 29.4	+1 9.1	+3 19 44.3	+1 7.3	9.856 6341	+347	
	3	157 58 16.2	1 37 27.8	0 49.7	3 21 39.6	0 48.0	9.856 7078	389	
	5	161 13 10.0	1 37 25.9	0 29.5	3 22 56.1	0 28.5	9.856 7898	431	
	7	164 27 59.4	1 37 23.5	+0 9.4	3 23 33.5	+0 8.9	9.856 8799	470	
	9	167 42 43.9	1 37 20.9	-0 11.1	3 23 31.8	-0 10.6	9.856 9777	508	
	11	170 57 22.8	1 37 17.9	-0 31.5	+3 22 51.1	-0 30.1	9.857 0829	+544	
	13	174 11 55.4	1 37 14.6	0 51.4	3 21 31.5	0 49.5	9.857 1952	579	
	15	177 26 21.2	1 37 11.1	1 10.6	3 19 33.3	1 8.6	9.857 3142	611	
	17	180 40 39.5	1 37 7.2	1 29.0	3 16 57.1	1 27.6	9.857 4395	642	
	19	183 54 49.9	1 37 3.1	1 46.1	3 13 43.2	1 46.2	9.857 5707	670	
	21	187 8 51.6	1 36 58.7	-2 2.0	+3 9 52.6	-2 4.4	9.857 7075	+697	
	23	190 22 44.4	1 36 54.1	2 16.3	3 5 25.9	2 22.2	9.857 8493	721	
	25	193 36 27.7	1 36 49.2	2 28.8	3 0 24.2	2 39.5	9.857 9957	742	
	27	196 50 1.2	1 36 44.2	2 39.4	2 54 48.4	2 56.2	9.858 1461	762	
	29	200 3 24.5	1 36 39.0	2 48.0	2 48 39.7	3 12.4	9.858 3003	779	
	31	203 16 37.3	1 36 33.8	-2 54.5	+2 41 59.4	-3 27.9	9.858 4575	+793	
	v.	2	206 29 39.6	1 36 28.4	2 58.8	2 34 48.7	3 42.7	9.858 6174	805
		4	209 42 30.9	1 36 22.9	3 0.8	2 27 9.2	3 56.7	9.858 7795	815
		6	212 55 11.3	1 36 17.4	3 0.6	2 19 2.3	4 10.0	9.858 9432	822
		8	216 7 40.7	1 36 12.0	2 58.1	2 10 29.6	4 22.5	9.859 1080	826
		10	219 19 59.2	1 36 6.5	-2 53.4	+2 1 32.8	-4 34.2	9.859 2734	+827
		12	222 32 6.7	1 36 1.0	2 46.5	1 52 13.6	4 44.9	9.859 4388	827
		14	225 44 3.3	1 35 55.6	2 37.5	1 42 33.9	4 54.7	9.859 6039	824
		16	228 55 49.2	1 35 50.3	2 26.6	1 32 35.5	5 3.6	9.859 7680	817
		18	232 7 24.7	1 35 45.2	2 13.9	1 22 20.3	5 11.5	9.859 9306	808
		20	235 18 50.0	1 35 40.1	-1 59.5	+1 11 50.3	-5 18.4	9.860 0911	+797
		22	238 30 5.3	1 35 35.2	1 43.6	1 1 7.4	5 24.4	9.860 2493	784
		24	241 41 11.1	1 35 30.6	1 26.5	0 50 13.6	5 29.3	9.860 4045	768
		26	244 52 7.7	1 35 26.1	1 8.4	0 39 11.0	5 33.2	9.860 5563	750
		28	248 2 55.6	1 35 21.8	0 49.4	0 28 1.6	5 36.1	9.860 7042	729
		30	251 13 35.2	1 35 17.8	-0 29.7	+0 16 47.4	-5 37.9	9.860 8478	+706
ec.		2	254 24 7.0	1 35 14.0	-0 9.8	+0 5 30.6	5 38.7	9.860 9866	682
	4	257 34 31.5	1 35 10.5	+0 10.3	-0 5 46.8	5 38.5	9.861 1203	655	
	6	260 44 49.3	1 35 7.3	0 30.2	0 17 2.8	5 37.3	9.861 2483	626	
	8	263 55 0.8	1 35 4.3	0 49.8	0 28 15.2	5 35.0	9.861 3704	595	
	10	267 5 6.7	1 35 1.6	+1 8.7	-0 39 22.0	-5 31.7	9.861 4862	+563	
	12	270 15 7.5	1 34 59.2	1 26.7	0 50 21.3	5 27.4	9.861 5953	528	
	14	273 25 3.8	1 34 57.2	1 43.7	1 1 11.1	5 22.2	9.861 6974	493	
	16	276 34 56.3	1 34 55.4	1 59.5	1 11 49.4	5 15.9	9.861 7922	455	
	18	279 44 45.4	1 34 53.8	2 13.8	1 22 14.2	5 8.8	9.861 8793	416	
	20	282 54 31.8	1 34 52.6	+2 26.4	-1 32 23.8	-5 0.7	9.861 9586	+376	
	22	286 4 16.0	1 34 51.6	2 37.2	1 42 16.3	4 51.7	9.862 0298	335	
	24	289 13 58.6	1 34 51.0	2 46.2	1 51 50.0	4 41.8	9.862 0927	293	
	26	292 23 40.2	1 34 50.7	2 53.1	2 1 3.1	4 31.1	9.862 1471	251	
	28	295 33 21.3	1 34 50.5	2 57.9	2 9 53.9	4 19.6	9.862 1929	207	
	30	298 43 2.3	1 34 50.6	+3 0.5	-2 18 21.0	-4 7.4	9.862 2299	+163	
	32	301 52 43.8	1 34 50.9	+3 0.9	-2 26 22.8	-3 54.3	9.862 2580	+118	

MEAN TIME.

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MEAN TIME.

MEAN TIME.

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	' "	"	° ' "	"		
Jan.	0	141 33 46.3	26 20.5	- 4.9	+1 50 53.5	- 2.4	0.220 5110	+ 767
	2	142 26 26.1	26 19.4	6.6	1 50 48.1	3.1	0.220 6592	715
	4	143 19 3.8	26 18.4	8.2	1 50 41.1	3.9	0.220 7971	664
	6	144 11 39.7	26 17.5	9.8	1 50 32.5	4.7	0.220 9248	612
	8	145 4 13.7	26 16.6	11.4	1 50 22.3	5.5	0.221 0421	561
	10	145 56 46.1	26 15.8	-13.0	+1 50 10.6	- 6.2	0.221 1491	+ 509
	12	146 49 17.0	26 15.1	14.6	1 49 57.4	7.0	0.221 2458	458
	14	147 41 46.6	26 14.5	16.2	1 49 42.7	7.7	0.221 3322	406
	16	148 34 15.0	26 13.9	17.8	1 49 26.6	8.5	0.221 4082	354
	18	149 26 42.3	26 13.4	19.3	1 49 8.8	9.3	0.221 4739	302
	20	150 19 8.7	26 13.0	-20.8	+1 48 49.5	-10.0	0.221 5291	+ 250
	22	151 11 34.4	26 12.7	22.3	1 48 28.6	10.8	0.221 5740	198
	24	152 3 59.5	26 12.4	23.8	1 48 6.3	11.5	0.221 6085	146
	26	152 56 24.1	26 12.2	25.3	1 47 42.5	12.2	0.221 6326	94
	28	153 48 48.5	26 12.1	26.7	1 47 17.3	13.0	0.221 6462	+ 42
	30	154 41 12.7	26 12.1	-28.1	+1 46 50.4	-13.8	0.221 6495	- 10
Feb.	1	155 33 36.9	26 12.1	29.5	1 46 22.1	14.5	0.221 6424	62
	3	156 26 1.2	26 12.2	30.9	1 45 52.3	15.2	0.221 6249	113
	5	157 18 25.9	26 12.4	32.2	1 45 21.1	16.0	0.221 5971	165
	7	158 10 51.0	26 12.7	33.5	1 44 48.4	16.7	0.221 5589	217
	9	159 3 16.6	26 13.0	-34.8	+1 44 14.2	-17.4	0.221 5104	- 269
	11	159 55 43.1	26 13.4	36.0	1 43 38.6	18.2	0.221 4514	321
	13	160 48 10.4	26 13.9	37.2	1 43 1.4	19.0	0.221 3820	373
	15	161 40 38.8	26 14.5	38.4	1 42 22.8	19.7	0.221 3023	424
	17	162 33 8.4	26 15.1	39.5	1 41 42.8	20.4	0.221 2123	476
	19	163 25 39.3	26 15.8	-40.6	+1 41 1.4	-21.1	0.221 1119	- 528
	21	164 18 11.7	26 16.6	41.6	1 40 18.5	21.8	0.221 0013	579
	23	165 10 45.8	26 17.5	42.7	1 39 34.1	22.5	0.220 8802	631
	25	166 3 21.7	26 18.4	43.6	1 38 48.4	23.2	0.220 7489	683
	27	166 55 59.5	26 19.5	44.6	1 38 1.2	23.9	0.220 6072	734
Mar.	1	167 48 39.4	26 20.5	-45.5	+1 37 12.6	-24.6	0.220 4553	- 785
	3	168 41 21.6	26 21.7	46.4	1 36 22.6	25.3	0.220 2931	836
	5	169 34 6.1	26 22.9	47.2	1 35 31.2	26.0	0.220 1207	888
	7	170 26 53.2	26 24.2	47.9	1 34 38.5	26.7	0.219 9381	939
	9	171 19 42.9	26 25.6	48.7	1 33 44.3	27.4	0.219 7453	989
	11	172 12 35.6	26 27.1	-49.4	+1 32 48.8	-28.1	0.219 5424	-1040
	13	173 5 31.2	26 28.6	50.0	1 31 51.9	28.8	0.219 3292	1091
	15	173 58 29.9	26 30.2	50.6	1 30 53.7	29.5	0.219 1059	1142
	17	174 51 32.0	26 31.9	51.1	1 29 54.0	30.2	0.218 8726	1192
	19	175 44 37.5	26 33.6	51.6	1 28 53.0	30.8	0.218 6292	1242
	21	176 37 46.6	26 35.5	-52.0	+1 27 50.7	-31.5	0.218 3757	-1292
	23	177 30 59.4	26 37.4	52.4	1 26 47.0	32.2	0.218 1123	1342
	25	178 24 16.2	26 39.4	52.8	1 25 42.0	32.8	0.217 8389	1392
	27	179 17 37.0	26 41.4	53.1	1 24 35.7	33.5	0.217 5555	1441
	29	180 11 1.9	26 43.6	53.3	1 23 28.1	34.1	0.217 2624	1490
	31	181 4 31.3	26 45.8	-53.5	+1 22 19.2	-34.8	0.216 9593	-1540
Apr.	2	181 58 5.2	26 48.1	-53.7	+1 21 8.9	-35.5	0.216 6464	-1589

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
	°	'	"	"	"	°	'	"	"		
pr. 2	181	58	5.2	26 48.1	-53.7	+1	21	8.9	-35.5	0.216 6464	-1589
4	182	51	43.7	26 50.4	53.8	1	19	57.4	36.0	0.216 3237	1638
6	183	45	27.0	26 52.9	53.8	1	18	44.7	36.7	0.215 9913	1686
8	184	39	15.3	26 55.4	53.8	1	17	30.6	37.3	0.215 6492	1735
10	185	33	8.6	26 58.0	53.7	1	16	15.4	38.0	0.215 2974	1783
12	186	27	7.3	27 0.7	-53.6	+1	14	58.8	-38.6	0.214 9361	-1820
14	187	21	11.3	27 3.4	53.4	1	13	41.0	39.2	0.214 5652	1878
16	188	15	21.0	27 6.2	53.2	1	12	22.0	39.8	0.214 1848	1925
18	189	9	36.3	27 9.1	52.9	1	11	1.8	40.4	0.213 7950	1972
20	190	3	57.5	27 12.1	52.6	1	9	40.3	41.0	0.213 3958	2019
22	190	58	24.7	27 15.1	-52.2	+1	8	17.6	-41.6	0.212 9873	-2066
24	191	52	58.1	27 18.3	51.7	1	6	53.8	42.2	0.212 5695	2112
26	192	47	37.8	27 21.5	51.2	1	5	28.7	42.8	0.212 1426	2158
28	193	42	24.0	27 24.7	50.7	1	4	2.5	43.4	0.211 7065	2208
30	194	37	16.8	27 28.1	50.1	1	2	35.2	44.0	0.211 2613	2248
ay 2	195	32	16.4	27 31.5	-49.4	+1	1	6.7	-44.5	0.210 8071	-2293
4	196	27	22.8	27 35.0	48.7	0	59	37.1	45.1	0.210 3439	2333
6	197	22	36.4	27 38.6	48.0	0	58	6.3	45.6	0.209 8719	2382
8	198	17	57.2	27 42.2	47.2	0	56	34.5	46.2	0.209 3912	2426
10	199	13	25.4	27 46.0	46.3	0	55	1.6	46.8	0.208 9017	2469
12	200	9	1.1	27 49.8	-45.4	+0	53	27.6	-47.3	0.208 4036	-2512
14	201	4	44.6	27 53.7	44.4	0	51	52.5	47.8	0.207 8970	2554
16	202	0	35.8	27 57.6	43.4	0	50	16.4	48.3	0.207 3819	2596
18	202	56	35.1	28 1.6	42.4	0	48	39.3	48.8	0.206 8585	2638
20	203	52	42.4	28 5.7	41.3	0	47	1.2	49.3	0.206 3268	2679
22	204	48	58.1	28 9.9	-40.1	+0	45	22.1	-49.8	0.205 7869	-2720
24	205	45	22.1	28 14.2	38.9	0	43	42.0	50.3	0.205 2389	2760
26	206	41	54.8	28 18.5	37.7	0	42	0.9	50.8	0.204 6830	2799
28	207	38	36.1	28 22.8	36.4	0	40	18.9	51.2	0.204 1192	2838
30	208	35	26.2	28 27.3	35.1	0	38	36.0	51.7	0.203 5476	2877
une 1	209	32	25.4	28 31.9	-33.7	+0	36	52.1	-52.2	0.202 9684	-2915
3	210	29	33.8	28 36.5	32.3	0	35	7.4	52.6	0.202 3815	2953
5	211	26	51.4	28 41.2	30.8	0	33	21.8	53.0	0.201 7873	2989
7	212	24	18.5	28 45.9	29.3	0	31	35.3	53.4	0.201 1858	3026
9	213	21	55.1	28 50.8	27.8	0	29	48.0	53.8	0.200 5770	3061
11	214	19	41.6	28 55.7	-26.2	+0	27	59.9	-54.2	0.199 9612	-3096
13	215	17	37.8	29 0.7	24.6	0	26	11.0	54.6	0.199 3385	3131
15	216	15	44.2	29 5.7	23.0	0	24	21.3	55.0	0.198 7089	3165
17	217	14	0.6	29 10.8	21.4	0	22	30.9	55.4	0.198 0726	3198
19	218	12	27.4	29 16.0	19.7	0	20	39.8	55.7	0.197 4298	3230
21	219	11	4.5	29 21.2	-18.0	+0	18	48.0	-56.1	0.196 7806	-3262
23	220	9	52.2	29 26.5	16.2	0	16	55.6	56.4	0.196 1252	3292
25	221	8	50.6	29 31.9	14.4	0	15	2.5	56.7	0.195 4637	3322
27	222	7	59.9	29 37.4	12.6	0	13	8.8	57.0	0.194 7962	3352
29	223	7	20.1	29 42.9	10.8	0	11	14.5	57.3	0.194 1229	3381
ly 1	224	6	51.4	29 48.4	- 9.0	+0	9	19.6	-57.5	0.193 4440	-3408
3	225	6	33.9	29 54.1	- 7.2	+0	7	24.3	-57.8	0.192 7596	-3435

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.
		°	'	"	'	"	°	'	"	"	
July	1	224	6	51.4	29	48.4	+0	9	19.6	-57.5	0.193 4440
	3	225	6	33.9	29	54.1	0	7	24.3	57.8	0.192 7596
	5	226	6	27.8	29	59.8	0	5	28.4	58.1	0.192 0700
	7	227	6	33.1	30	5.5	0	3	32.0	58.3	0.191 3752
	9	228	6	50.0	30	11.4	+0	1	35.2	58.5	0.190 6755
	11	229	7	18.7	30	17.3	-0	0	22.0	-58.7	0.189 9711
	13	230	7	59.1	30	23.2	0	2	19.5	58.9	0.189 2620
	15	231	8	51.5	30	29.2	0	4	17.5	59.1	0.188 5487
	17	232	9	56.0	30	35.3	0	6	15.8	59.2	0.187 8311
	19	233	11	12.6	30	41.4	0	8	14.3	59.3	0.187 1095
	21	234	12	41.5	30	47.5	-0	10	13.1	-59.4	0.186 3841
	23	235	14	22.8	30	53.8	0	12	12.0	59.5	0.185 6552
Aug.	25	236	16	16.6	31	0.0	0	14	11.1	59.6	0.184 9229
	27	237	18	23.0	31	6.3	0	16	10.3	59.6	0.184 1875
	29	238	20	42.0	31	12.7	0	18	9.7	59.6	0.183 4491
	31	239	23	13.9	31	19.2	-0	20	9.0	-59.6	0.182 7080
	2	240	25	58.6	31	25.6	0	22	8.4	59.7	0.181 9645
	4	241	28	56.3	31	32.1	0	24	7.8	59.7	0.181 2187
	6	242	32	7.0	31	38.6	0	26	7.0	59.6	0.180 4709
	8	243	35	30.9	31	45.2	0	28	6.2	59.5	0.179 7215
	10	244	39	7.9	31	51.8	-0	30	5.1	-59.4	0.178 9704
	12	245	42	58.3	31	58.5	0	32	3.9	59.3	0.178 2182
	14	246	47	2.0	32	5.2	0	34	2.4	59.2	0.177 4649
	16	247	51	19.1	32	11.9	0	36	0.6	59.0	0.176 7109
Sept.	18	248	55	49.6	32	18.6	0	37	58.4	58.8	0.175 9564
	20	250	0	33.6	32	25.4	-0	39	55.9	-58.6	0.175 2018
	22	251	5	31.2	32	32.2	0	41	52.9	58.4	0.174 4471
	24	252	10	42.5	32	39.0	0	43	49.5	58.2	0.173 6929
	26	253	16	7.4	32	45.9	0	45	45.5	57.9	0.172 9393
	28	254	21	46.0	32	52.7	0	47	40.9	57.5	0.172 1866
	30	255	27	38.3	32	59.6	-0	49	35.6	-57.2	0.171 4351
	1	256	33	44.5	33	6.5	0	51	29.6	56.8	0.170 6851
	3	257	40	4.3	33	13.3	0	53	22.9	56.4	0.169 9370
	5	258	46	37.9	33	20.3	0	55	15.4	56.0	0.169 1909
	7	259	53	25.4	33	27.2	0	57	7.1	55.6	0.168 4473
	9	261	0	26.6	33	34.0	-0	58	57.7	-55.1	0.167 7064
Oct.	11	262	7	41.6	33	40.9	1	0	47.5	54.6	0.166 9685
	13	263	15	10.4	33	47.8	1	2	36.1	54.0	0.166 2340
	15	264	22	53.0	33	54.7	1	4	23.7	53.5	0.165 5031
	17	265	30	49.3	34	1.6	1	6	10.2	52.9	0.164 7763
	19	266	38	59.3	34	8.4	-1	7	55.4	-52.3	0.164 0537
	21	267	47	23.0	34	15.3	1	9	39.4	51.7	0.163 3358
	23	268	56	0.3	34	22.0	1	11	22.1	51.0	0.162 6229
	25	270	4	51.1	34	28.8	1	13	3.4	50.3	0.161 9153
	27	271	13	55.6	34	35.6	1	14	43.2	49.6	0.161 2132
	29	272	23	13.4	34	42.2	-1	16	21.6	-48.8	0.160 5173
	1	273	32	44.6	34	48.9	-1	17	58.4	-48.0	0.159 8277

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	' "	"	° ' "	"		
ct.	1	273 32 44.6	34 48.9	+53.8	-1 17 58.4	-48.0	0.159 8277	-3432
	3	274 42 29.2	34 55.6	53.8	1 19 33.6	47.2	0.159 1447	3398
	5	275 52 26.9	35 2.1	53.7	1 21 7.1	46.4	0.158 4686	3362
	7	277 2 37.6	35 8.6	53.5	1 22 39.0	45.5	0.157 7999	3324
	9	278 13 1.5	35 15.2	53.2	1 24 9.0	44.5	0.157 1389	3285
	11	279 23 38.2	35 21.5	+52.8	-1 25 37.1	-43.6	0.156 4859	-3244
	13	280 34 27.6	35 27.9	52.4	1 27 3.4	42.6	0.155 8413	3202
	15	281 45 29.7	35 34.2	51.8	1 28 27.7	41.6	0.155 2053	3157
	17	282 56 44.4	35 40.4	51.1	1 29 49.9	40.6	0.154 5784	3111
	19	284 8 11.3	35 46.5	50.4	1 31 10.0	39.6	0.153 9608	3064
	21	285 19 50.5	35 52.6	+49.6	-1 32 28.1	-38.5	0.153 3530	-3014
	23	286 31 41.7	35 58.6	48.7	1 33 43.9	37.3	0.152 7552	2963
	25	287 43 44.8	36 4.5	47.7	1 34 57.4	36.2	0.152 1678	2910
	27	288 55 59.6	36 10.3	46.6	1 36 8.7	35.0	0.151 5911	2856
	29	290 8 25.8	36 16.0	45.4	1 37 17.5	33.8	0.151 0255	2800
	31	291 21 3.4	36 21.6	+44.1	-1 38 23.9	-32.6	0.150 4713	-2742
ov.	2	292 33 52.0	36 27.0	42.8	1 39 27.9	31.4	0.149 9288	2683
	4	293 46 51.5	36 32.4	41.4	1 40 29.3	30.1	0.149 3983	2622
	6	295 0 1.7	36 37.7	39.9	1 41 28.2	28.8	0.148 8802	2559
	8	296 13 22.3	36 42.9	38.3	1 42 24.4	27.4	0.148 3746	2496
	10	297 26 53.2	36 47.9	+36.7	-1 43 17.9	-26.1	0.147 8820	-2430
	12	298 40 33.9	36 52.8	34.9	1 44 8.8	24.7	0.147 4027	2362
	14	299 54 24.4	36 57.6	33.1	1 44 56.8	23.3	0.146 9370	2294
	16	301 8 24.3	37 2.2	31.3	1 45 42.1	21.9	0.146 4851	2224
	18	302 22 33.3	37 6.8	29.4	1 46 24.5	20.5	0.146 0473	2153
	20	303 36 51.3	37 11.2	+27.4	-1 47 4.0	-19.0	0.145 6238	-2081
	22	304 51 17.9	37 15.4	25.4	1 47 40.5	17.5	0.145 2151	2006
	24	306 5 52.7	37 19.4	23.3	1 48 14.1	16.0	0.144 8213	1931
	26	307 20 35.5	37 23.4	21.2	1 48 44.7	14.5	0.144 4426	1855
	28	308 35 26.1	37 27.1	19.0	1 49 12.3	13.0	0.144 0794	1777
	30	309 50 24.0	37 30.8	+16.8	-1 49 36.8	-11.5	0.143 7319	-1698
hec.	2	311 5 29.1	37 34.2	14.5	1 49 58.3	10.0	0.143 4003	1618
	4	312 20 40.9	37 37.5	12.2	1 50 16.6	8.4	0.143 0848	1537
	6	313 35 59.0	37 40.6	9.9	1 50 31.7	6.8	0.142 7856	1455
	8	314 51 23.2	37 43.6	7.6	1 50 43.6	5.2	0.142 5029	1372
	10	316 6 53.2	37 46.4	+ 5.3	-1 50 52.4	- 3.6	0.142 2369	-1288
	12	317 22 28.6	37 48.9	2.9	1 50 58.0	2.0	0.141 9878	1203
	14	318 38 8.9	37 51.4	+ 0.6	1 51 0.4	- 0.4	0.141 7558	1117
	16	319 53 54.0	37 53.6	- 1.8	1 50 59.5	+ 1.2	0.141 5410	1031
	18	321 9 43.4	37 55.7	4.2	1 50 55.5	2.8	0.141 3436	944
	20	322 25 36.7	37 57.6	- 6.5	-1 50 48.1	+ 4.5	0.141 1636	- 856
	22	323 41 33.6	37 59.3	8.9	1 50 37.6	6.1	0.141 0013	767
	24	324 57 33.7	38 0.8	11.2	1 50 23.7	7.7	0.140 8567	678
	26	326 13 36.7	38 2.1	13.6	1 50 6.7	9.3	0.140 7300	589
	28	327 29 42.1	38 3.2	15.8	1 49 46.3	11.0	0.140 6212	499
	30	328 45 49.5	38 4.2	-18.1	-1 49 22.8	+12.6	0.140 5305	- 408
	32	330 1 58.6	38 4.9	-20.3	-1 48 56.0	+14.2	0.140 4578	- 318

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Paralax.	Transit, Meridian of Greenwich.	
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.		
	h	m	s	s	°	'	"	"			"	"	h m	
May	17	5	3	59.09	+2.400	+22	28	27.6	+3.51	0.780 1707	+184.6	15.61	1.46	1 26.3
	18	5	4	56.77	2.406	22	29	51.2	3.46	0.780 6067	178.7	15.60	1.46	1 23.3
	19	5	5	54.60	2.412	22	31	13.5	3.41	0.781 0286	172.9	15.58	1.46	1 20.4
	20	5	6	52.57	2.418	22	32	34.7	3.36	0.781 4364	167.0	15.57	1.46	1 17.4
	21	5	7	50.68	2.424	22	33	54.7	3.31	0.781 8301	161.1	15.55	1.45	1 14.4
	22	5	8	48.93	+2.430	+22	35	13.5	+3.26	0.782 2097	+155.2	15.54	1.45	1 11.5
	23	5	9	47.31	2.435	22	36	31.0	3.20	0.782 5751	149.3	15.53	1.45	1 8.5
	24	5	10	45.81	2.440	22	37	47.3	3.15	0.782 9265	143.5	15.52	1.45	1 5.5
	25	5	11	44.43	2.445	22	39	2.3	3.10	0.783 2637	137.6	15.50	1.45	1 2.6
	26	5	12	43.16	2.449	22	40	16.0	3.04	0.783 5869	131.7	15.49	1.45	0 59.6
	27	5	13	42.00	+2.454	+22	41	28.4	+2.99	0.783 8960	+125.9	15.48	1.45	0 56.7
	28	5	14	40.95	2.458	22	42	39.4	2.93	0.784 1910	120.0	15.47	1.45	0 53.7
	29	5	15	40.00	2.462	22	43	49.2	2.88	0.784 4720	114.2	15.46	1.45	0 50.8
	30	5	16	39.14	2.466	22	44	57.6	2.82	0.784 7390	108.3	15.45	1.44	0 47.8
	31	5	17	38.37	2.470	22	46	4.6	2.76	0.784 9919	102.5	15.44	1.44	0 44.9
June	1	5	18	37.69	+2.473	+22	47	10.3	+2.71	0.785 2309	+96.6	15.43	1.44	0 41.9
	2	5	19	37.09	2.477	22	48	14.7	2.65	0.785 4557	90.7	15.42	1.44	0 39.0
	3	5	20	36.57	2.480	22	49	17.6	2.59	0.785 6663	84.8	15.42	1.44	0 36.0
	4	5	21	36.12	2.482	22	50	19.2	2.54	0.785 8627	78.9	15.41	1.44	0 33.1
	5	5	22	35.73	2.485	22	51	19.3	2.48	0.786 0449	73.0	15.40	1.44	0 30.1
	6	5	23	35.41	+2.487	+22	52	18.0	+2.42	0.786 2129	+67.0	15.40	1.44	0 27.2
	7	5	24	35.13	2.490	22	53	15.3	2.36	0.786 3666	61.1	15.39	1.44	0 24.2
	8	5	25	34.91	2.491	22	54	11.2	2.30	0.786 5060	55.1	15.39	1.44	0 21.3
	9	5	26	34.72	2.493	22	55	5.7	2.24	0.786 6311	49.2	15.38	1.44	0 18.4
	10	5	27	34.57	2.495	22	55	58.7	2.18	0.786 7420	43.2	15.38	1.44	0 15.4
	11	5	28	34.46	+2.496	+22	56	50.3	+2.12	0.786 8385	+37.3	15.38	1.44	0 12.5
	12	5	29	34.36	2.497	22	57	40.4	2.06	0.786 9208	31.3	15.37	1.44	0 9.5
	13	5	30	34.28	2.497	22	58	29.1	2.00	0.786 9889	25.4	15.37	1.44	0 6.6
	14	5	31	34.21	2.497	22	59	16.3	1.94	0.787 0428	19.5	15.37	1.44	0 3.7
	15	5	32	34.15	2.497	23	0	2.1	1.88	0.787 0826	13.6	15.37	1.44	{ 0 0.7 23 57.8
	16	5	33	34.09	+2.497	+23	0	46.5	+1.82	0.787 1082	+7.7	15.37	1.44	23 54.9
	17	5	34	34.03	2.497	23	1	29.4	1.76	0.787 1196	+1.8	15.37	1.44	23 51.9
	18	5	35	33.96	2.497	23	2	10.8	1.69	0.787 1169	-4.0	15.37	1.44	23 49.0
	19	5	36	33.87	2.496	23	2	50.7	1.63	0.787 1002	9.9	15.37	1.44	23 46.1
	20	5	37	33.76	2.495	23	3	29.2	1.57	0.787 0694	15.8	15.37	1.44	23 43.1
	21	5	38	33.63	+2.494	+23	4	6.1	+1.51	0.787 0246	-21.6	15.37	1.44	23 40.2
	22	5	39	33.47	2.492	23	4	41.6	1.45	0.786 9658	27.4	15.37	1.44	23 37.2
	23	5	40	33.27	2.491	23	5	15.7	1.39	0.786 8930	33.2	15.37	1.44	23 34.3
	24	5	41	33.04	2.489	23	5	48.2	1.32	0.786 8062	39.1	15.38	1.44	23 31.3
	25	5	42	32.76	2.487	23	6	19.3	1.26	0.786 7055	44.9	15.38	1.44	23 28.4
	26	5	43	32.44	+2.485	+23	6	48.9	+1.20	0.786 5908	-50.7	15.38	1.44	23 25.5
	27	5	44	32.06	2.483	23	7	17.1	1.14	0.786 4621	56.5	15.39	1.44	23 22.5
	28	5	45	31.63	2.481	23	7	43.7	1.08	0.786 3195	62.3	15.39	1.44	23 19.6
	29	5	46	31.13	2.478	23	8	8.9	1.02	0.786 1629	68.2	15.40	1.44	23 16.6
	30	5	47	30.58	2.475	23	8	32.6	0.96	0.785 9922	74.0	15.41	1.44	23 13.7
July	1	5	48	29.95	+2.472	+23	8	54.9	+0.90	0.785 8075	-79.9	15.41	1.44	23 10.7
	2	5	49	29.25	+2.469	+23	9	15.7	+0.84	0.785 6088	-85.7	15.42	1.44	23 7.8

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Paral- lax.	Transit, Meridian of Greenwich.		
	Noon.				Noon.									Noon.	Noon.
	h	m	s	s	°	'	"	"			"	"	h m		
J.	16	6	31	4.73	+2.070	+23	2	39.1	-1.35	0.762 4324	-339.5	16.26	1.52	20 52.1	
	17	6	31	54.23	2.055	23	2	6.4	1.38	0.761 6113	344.7	16.30	1.52	20 49.0	
	18	6	32	43.38	2.040	23	1	33.1	1.40	0.760 7776	350.0	16.33	1.53	20 45.8	
	19	6	33	32.16	2.025	23	0	59.1	1.43	0.759 9315	355.1	16.36	1.53	20 42.7	
	20	6	34	20.58	2.010	23	0	24.4	1.46	0.759 0730	360.3	16.39	1.53	20 39.6	
	21	6	35	8.62	+1.994	+22	59	49.1	-1.48	0.758 2023	-365.3	16.42	1.54	20 36.4	
	22	6	35	56.29	1.978	22	59	13.2	1.51	0.757 3194	370.4	16.46	1.54	20 33.3	
	23	6	36	43.57	1.962	22	58	36.8	1.53	0.756 4243	375.5	16.49	1.54	20 30.1	
	24	6	37	30.45	1.945	22	57	59.9	1.55	0.755 5170	380.6	16.53	1.54	20 27.0	
	25	6	38	16.94	1.929	22	57	22.4	1.57	0.754 5973	385.7	16.56	1.55	20 23.8	
	26	6	39	3.03	+1.912	+22	56	44.4	-1.59	0.753 6655	-390.7	16.60	1.55	20 20.7	
	27	6	39	48.70	1.894	22	56	6.0	1.61	0.752 7218	395.7	16.63	1.55	20 17.5	
	28	6	40	33.95	1.877	22	55	27.2	1.62	0.751 7663	400.6	16.67	1.56	20 14.3	
	29	6	41	18.78	1.859	22	54	48.0	1.64	0.750 7987	405.6	16.71	1.56	20 11.1	
	30	6	42	3.17	1.840	22	54	8.3	1.66	0.749 8192	410.6	16.74	1.57	20 7.9	
	31	6	42	47.12	+1.822	+22	53	28.4	-1.67	0.748 8280	-415.4	16.78	1.57	20 4.7	
	pt.	1	6	43	30.61	1.803	22	52	48.2	1.68	0.747 8252	420.2	16.82	1.57	20 1.5
		2	6	44	13.65	1.784	22	52	7.7	1.69	0.746 8108	425.0	16.86	1.58	19 58.2
		3	6	44	56.22	1.764	22	51	27.1	1.70	0.745 7850	429.8	16.90	1.58	19 55.0
		4	6	45	38.31	1.744	22	50	46.2	1.71	0.744 7479	434.4	16.94	1.58	19 51.8
5		6	46	19.92	+1.724	+22	50	5.2	-1.71	0.743 6997	-439.1	16.98	1.59	19 48.5	
6		6	47	1.04	1.703	22	49	24.1	1.72	0.742 6404	443.6	17.02	1.59	19 45.3	
7		6	47	41.66	1.682	22	48	42.8	1.72	0.741 5703	448.1	17.06	1.60	19 42.0	
8		6	48	21.78	1.661	22	48	1.5	1.72	0.740 4893	452.6	17.11	1.60	19 38.7	
9		6	49	1.38	1.639	22	47	20.2	1.72	0.739 3978	457.0	17.15	1.60	19 35.4	
10		6	49	40.46	+1.617	+22	46	38.9	-1.72	0.738 2958	-461.3	17.19	1.61	19 32.1	
	11	6	50	19.02	1.595	22	45	57.6	1.72	0.737 1835	465.6	17.24	1.61	19 28.8	
	12	6	50	57.04	1.573	22	45	16.5	1.71	0.736 0611	469.7	17.28	1.62	19 25.5	
	13	6	51	34.51	1.550	22	44	35.4	1.71	0.734 9287	473.9	17.33	1.62	19 22.2	
	14	6	52	11.44	1.527	22	43	54.5	1.70	0.733 7866	477.9	17.37	1.62	19 18.9	
	15	6	52	47.81	+1.504	+22	43	13.7	-1.69	0.732 6349	-481.8	17.42	1.63	19 15.6	
	16	6	53	23.62	1.480	22	42	33.2	1.68	0.731 4738	485.7	17.47	1.63	19 12.2	
	17	6	53	58.86	1.456	22	41	52.9	1.67	0.730 3033	489.6	17.51	1.64	19 8.9	
	18	6	54	33.53	1.432	22	41	12.9	1.66	0.729 1238	493.3	17.56	1.64	19 5.5	
	19	6	55	7.61	1.408	22	40	33.2	1.65	0.727 9353	497.0	17.61	1.65	19 2.1	
	20	6	55	41.10	+1.383	+22	39	53.8	-1.63	0.726 7380	-500.7	17.66	1.65	18 58.7	
	21	6	56	14.00	1.358	22	39	14.8	1.62	0.725 5320	504.3	17.71	1.66	18 55.3	
	22	6	56	46.30	1.333	22	38	36.2	1.60	0.724 3175	507.8	17.76	1.66	18 51.9	
	23	6	57	17.98	1.307	22	37	58.1	1.58	0.723 0947	511.2	17.81	1.66	18 48.5	
	24	6	57	49.05	1.281	22	37	20.4	1.56	0.721 8637	514.6	17.86	1.67	18 45.1	
	25	6	58	19.49	+1.255	+22	36	43.2	-1.54	0.720 6248	-517.9	17.91	1.67	18 41.7	
	26	6	58	49.29	1.228	22	36	6.6	1.51	0.719 3780	521.1	17.96	1.68	18 38.2	
	27	6	59	18.45	1.201	22	35	30.5	1.49	0.718 1237	524.2	18.01	1.68	18 34.8	
	28	6	59	46.96	1.174	22	34	55.1	1.46	0.716 8620	527.2	18.06	1.69	18 31.3	
	29	7	0	14.80	1.146	22	34	20.3	1.44	0.715 5932	530.1	18.12	1.69	18 27.8	
	30	7	0	41.97	+1.118	+22	33	46.2	-1.40	0.714 3176	-532.9	18.17	1.70	18 24.3	
kt.	1	7	1	8.47	+1.090	+22	33	12.9	-1.37	0.713 0355	-535.5	18.22	1.70	18 20.8	

JUPITER, 1918.
GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Paralax.	Transit, Meridian of Greenwich.	
		Noon.				Noon.									Noon.
		h	m	s	s	°	'	"	"			"	"	h	m
Oct.	1	7	1	8.47	+1.090	+22	33	12.9	-1.37	0.713 0355	-535.5	18.22	1.70	18	20.8
	2	7	1	34.28	1.061	22	32	40.4	1.34	0.711 7470	538.1	18.28	1.71	18	17.3
	3	7	1	59.39	1.032	22	32	8.6	1.31	0.710 4524	540.6	18.33	1.71	18	13.8
	4	7	2	23.80	1.002	22	31	37.7	1.27	0.709 1521	542.9	18.39	1.72	18	10.3
	5	7	2	47.50	0.973	22	31	7.6	1.24	0.707 8463	545.2	18.44	1.72	18	6.7
	6	7	3	10.48	+0.942	+22	30	38.4	-1.20	0.706 5354	-547.2	18.50	1.73	18	3.2
	7	7	3	32.74	0.912	22	30	10.1	1.16	0.705 2196	549.2	18.56	1.73	17	59.6
	8	7	3	54.27	0.882	22	29	42.8	1.12	0.703 8994	551.0	18.61	1.74	17	56.0
	9	7	4	15.06	0.851	22	29	16.5	1.08	0.702 5751	552.6	18.67	1.75	17	52.4
	10	7	4	35.11	0.820	22	28	51.2	1.03	0.701 2470	554.1	18.73	1.75	17	48.8
	11	7	4	54.40	+0.788	+22	28	27.0	-0.99	0.699 9153	-555.5	18.78	1.76	17	45.2
	12	7	5	12.94	0.756	22	28	3.9	0.94	0.698 5805	556.8	18.84	1.76	17	41.5
	13	7	5	30.71	0.725	22	27	41.8	0.90	0.697 2428	557.9	18.90	1.77	17	37.9
	14	7	5	47.72	0.693	22	27	20.8	0.85	0.695 9028	558.8	18.96	1.77	17	34.2
	15	7	6	3.95	0.660	22	27	1.0	0.80	0.694 5607	559.6	19.02	1.78	17	30.5
	16	7	6	19.41	+0.628	+22	26	42.3	-0.75	0.693 2169	-560.2	19.07	1.78	17	26.8
	17	7	6	34.08	0.595	22	26	24.8	0.70	0.691 8717	560.7	19.13	1.79	17	23.1
	18	7	6	47.96	0.562	22	26	8.5	0.65	0.690 5256	561.0	19.19	1.79	17	19.4
	19	7	7	1.05	0.529	22	25	53.5	0.60	0.689 1788	561.3	19.25	1.80	17	15.7
	20	7	7	13.34	0.495	22	25	39.7	0.55	0.687 8315	561.4	19.31	1.81	17	12.0
	21	7	7	24.83	+0.462	+22	25	27.2	-0.50	0.686 4843	-561.2	19.37	1.81	17	8.2
	22	7	7	35.51	0.428	22	25	15.9	0.44	0.685 1377	560.9	19.43	1.82	17	4.5
	23	7	7	45.37	0.394	22	25	6.0	0.39	0.683 7919	560.5	19.49	1.82	17	0.7
	24	7	7	54.41	0.359	22	24	57.4	0.33	0.682 4471	560.0	19.55	1.83	16	56.9
	25	7	8	2.62	0.325	22	24	50.2	0.27	0.681 1041	559.1	19.61	1.83	16	53.1
	26	7	8	9.99	+0.290	+22	24	44.4	-0.21	0.679 7633	-558.1	19.67	1.84	16	49.3
	27	7	8	16.53	0.255	22	24	39.9	0.16	0.678 4251	557.0	19.74	1.84	16	45.4
	28	7	8	22.22	0.220	22	24	36.9	0.09	0.677 0898	555.7	19.80	1.85	16	41.6
	29	7	8	27.07	0.184	22	24	35.4	-0.03	0.675 7581	554.1	19.86	1.86	16	37.7
	30	7	8	31.06	0.149	22	24	35.3	+0.02	0.674 4305	552.2	19.92	1.86	16	33.9
	31	7	8	34.20	+0.113	+22	24	36.6	+0.09	0.673 1075	-550.2	19.98	1.87	16	30.0
Nov.	1	7	8	36.48	0.077	22	24	39.4	0.15	0.671 7894	548.1	20.04	1.87	16	26.1
	2	7	8	37.90	0.041	22	24	43.6	0.21	0.670 4769	545.6	20.10	1.88	16	22.2
	3	7	8	38.46	+0.005	22	24	49.3	0.27	0.669 1706	542.9	20.16	1.88	16	18.2
	4	7	8	38.15	-0.031	22	24	56.4	0.33	0.667 8711	540.0	20.22	1.89	16	14.2
	5	7	8	36.98	-0.067	+22	25	5.0	+0.39	0.666 5788	-536.9	20.28	1.90	16	10.3
	6	7	8	34.94	0.103	22	25	15.1	0.45	0.665 2943	533.5	20.34	1.90	16	6.3
	7	7	8	32.04	0.139	22	25	26.7	0.51	0.664 0182	529.9	20.40	1.91	16	2.3
	8	7	8	28.27	0.175	22	25	39.7	0.57	0.662 7510	526.1	20.46	1.91	15	58.3
	9	7	8	23.64	0.211	22	25	54.2	0.63	0.661 4933	522.0	20.52	1.92	15	54.3
	10	7	8	18.15	-0.247	+22	26	10.1	+0.69	0.660 2457	-517.6	20.58	1.92	15	50.3
	11	7	8	11.80	0.282	22	26	27.4	0.75	0.659 0086	513.1	20.64	1.93	15	46.2
	12	7	8	4.60	0.318	22	26	46.1	0.81	0.657 7828	508.3	20.70	1.94	15	42.2
	13	7	7	56.54	0.353	22	27	6.3	0.87	0.656 5687	503.3	20.75	1.94	15	38.1
	14	7	7	47.64	0.389	22	27	27.8	0.92	0.655 3670	498.1	20.81	1.95	15	34.0
	15	7	7	37.89	-0.424	+22	27	50.7	+0.98	0.654 1780	-492.7	20.87	1.95	15	29.9
	16	7	7	27.30	-0.459	+22	28	15.0	+1.04	0.653 0025	-486.9	20.93	1.96	15	25.8

GREENWICH MEAN TIME.

FOR

MEAN NOON.

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- lax.
		Noon.				Noon.							
		h	m	s	s	°	'	"	"			"	"
Jan.	1	9	4	18.03	-0.607	+17	35	4.4	+3.00	0.918 0786	-196.7	9.35	1.06
	2	9	4	3.31	0.620	17	36	16.9	3.05	0.917 6131	191.1	9.36	1.06
	3	9	3	48.28	0.632	17	37	30.6	3.09	0.917 1611	185.5	9.37	1.06
	4	9	3	32.95	0.645	17	38	45.4	3.14	0.916 7226	179.8	9.38	1.07
	5	9	3	17.32	0.657	17	40	1.3	3.19	0.916 2980	174.0	9.39	1.07
	6	9	3	1.41	-0.669	+17	41	18.3	+3.23	0.915 8874	-168.1	9.40	1.07
	7	9	2	45.23	0.680	17	42	36.3	3.27	0.915 4911	162.1	9.41	1.07
	8	9	2	28.77	0.691	17	43	55.2	3.31	0.915 1094	156.0	9.42	1.07
	9	9	2	12.06	0.701	17	45	15.0	3.34	0.914 7424	149.8	9.43	1.07
	10	9	1	55.10	0.712	17	46	35.7	3.38	0.914 3904	143.5	9.43	1.07
	11	9	1	37.89	-0.722	+17	47	57.2	+3.41	0.914 0534	-137.2	9.44	1.07
	12	9	1	20.46	0.731	17	49	19.4	3.44	0.913 7318	130.8	9.45	1.07
	13	9	1	2.81	0.740	17	50	42.4	3.47	0.913 4256	124.3	9.45	1.07
	14	9	0	44.94	0.748	17	52	6.0	3.50	0.913 1351	117.8	9.46	1.07
	15	9	0	26.88	0.756	17	53	30.2	3.52	0.912 8604	111.1	9.47	1.08
	16	9	0	8.64	-0.764	+17	54	55.0	+3.54	0.912 6017	-104.4	9.47	1.08
	17	8	59	50.22	0.771	17	56	20.3	3.56	0.912 3591	97.7	9.48	1.08
	18	8	59	31.63	0.778	17	57	46.1	3.58	0.912 1326	91.0	9.48	1.08
	19	8	59	12.88	0.784	17	59	12.3	3.60	0.911 9224	84.2	9.49	1.08
	20	8	58	53.99	0.790	18	0	38.8	3.61	0.911 7286	77.3	9.49	1.08
	21	8	58	34.97	-0.795	+18	2	5.6	+3.62	0.911 5512	-70.5	9.50	1.08
	22	8	58	15.83	0.800	18	3	32.7	3.63	0.911 3903	63.6	9.50	1.08
	23	8	57	56.58	0.804	18	4	59.9	3.64	0.911 2460	56.7	9.50	1.08
	24	8	57	37.23	0.808	18	6	27.3	3.65	0.911 1183	49.7	9.50	1.08
	25	8	57	17.79	0.812	18	7	54.9	3.65	0.911 0073	42.8	9.51	1.08
	26	8	56	58.27	-0.815	+18	9	22.5	+3.65	0.910 9130	-35.8	9.51	1.08
	27	8	56	38.68	0.818	18	10	50.1	3.65	0.910 8355	28.8	9.51	1.08
	28	8	56	19.03	0.820	18	12	17.7	3.65	0.910 7749	21.8	9.51	1.08
	29	8	55	59.34	0.821	18	13	45.2	3.64	0.910 7311	14.7	9.51	1.08
	30	8	55	39.61	0.822	18	15	12.6	3.64	0.910 7041	7.7	9.51	1.08
	31	8	55	19.86	-0.823	+18	16	39.8	+3.63	0.910 6941	-0.7	9.52	1.08
Feb.	1	8	55	0.10	0.823	18	18	6.8	3.62	0.910 7009	+6.4	9.51	1.08
	2	8	54	40.34	0.823	18	19	33.6	3.61	0.910 7246	13.4	9.51	1.08
	3	8	54	20.58	0.823	18	21	0.0	3.59	0.910 7651	20.4	9.51	1.08
	4	8	54	0.85	0.821	18	22	26.1	3.58	0.910 8226	27.5	9.51	1.08
	5	8	53	41.15	-0.820	+18	23	51.8	+3.56	0.910 8970	+34.5	9.51	1.08
	6	8	53	21.49	0.818	18	25	17.1	3.54	0.910 9883	41.5	9.51	1.08
	7	8	53	1.88	0.815	18	26	41.8	3.52	0.911 0964	48.5	9.51	1.08
	8	8	52	42.35	0.812	18	28	6.1	3.50	0.911 2213	55.5	9.50	1.08
	9	8	52	22.89	0.809	18	29	29.7	3.47	0.911 3629	62.5	9.50	1.08
	10	8	52	3.53	-0.805	+18	30	52.7	+3.44	0.911 5212	+69.4	9.50	1.08
	11	8	51	44.27	0.800	18	32	15.0	3.41	0.911 6960	76.3	9.49	1.08
	12	8	51	25.12	0.795	18	33	36.6	3.38	0.911 8873	83.1	9.49	1.08
	13	8	51	6.09	0.790	18	34	57.3	3.35	0.912 0950	89.9	9.48	1.08
	14	8	50	47.21	0.784	18	36	17.3	3.31	0.912 3189	96.7	9.48	1.08
	15	8	50	28.47	-0.778	+18	37	36.4	+3.28	0.912 5590	+103.3	9.47	1.08
	16	8	50	9.89	-0.771	+18	38	54.6	+3.24	0.912 8149	+109.9	9.47	1.08

GREENWICH MEAN TIME.

SATURN, 1918.
GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

SATURN, 1918.
GREENWICH MEAN TIME.

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GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.		Var. per Hour.	Polar Semi-diameter.	Hor. Paralax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.		Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"				"	"	h m
g. 16	9	25	47.06	+1.270	+16	8	8.0	-5.77	1.007 6787	- 20.1	7.61	0.86		23 46.1
17	9	26	17.53	1.269	16	5	49.5	5.77	1.007 6254	24.4	7.61	0.86		23 42.7
18	9	26	47.96	1.267	16	3	30.9	5.77	1.007 5618	28.6	7.61	0.86		23 39.2
19	9	27	18.35	1.265	16	1	12.3	5.77	1.007 4880	32.9	7.61	0.86		23 35.8
20	9	27	48.70	1.263	15	58	53.7	5.77	1.007 4040	37.1	7.61	0.87		23 32.4
21	9	28	19.00	+1.261	+15	56	35.1	-5.77	1.007 3098	- 41.4	7.62	0.87		23 28.9
22	9	28	49.25	1.259	15	54	16.5	5.77	1.007 2053	45.6	7.62	0.87		23 25.5
23	9	29	19.45	1.257	15	51	58.0	5.77	1.007 0907	49.9	7.62	0.87		23 22.1
24	9	29	49.59	1.254	15	49	39.5	5.77	1.006 9659	54.1	7.62	0.87		23 18.7
25	9	30	19.66	1.252	15	47	21.1	5.76	1.006 8310	58.3	7.62	0.87		23 15.2
26	9	30	49.67	+1.249	+15	45	2.8	-5.76	1.006 6859	- 62.6	7.63	0.87		23 11.8
27	9	31	19.61	1.246	15	42	44.6	5.75	1.006 5306	66.8	7.63	0.87		23 8.4
28	9	31	49.48	1.243	15	40	26.6	5.75	1.006 3652	71.1	7.63	0.87		23 4.9
29	9	32	19.27	1.240	15	38	8.7	5.74	1.006 1895	75.3	7.64	0.87		23 1.5
30	9	32	48.98	1.236	15	35	51.0	5.73	1.006 0037	79.5	7.64	0.87		22 58.0
31	9	33	18.61	+1.232	+15	33	33.6	-5.72	1.005 8077	- 83.8	7.64	0.87		22 54.6
pt. 1	9	33	48.14	1.229	15	31	16.5	5.71	1.005 6015	88.0	7.65	0.87		22 51.1
2	9	34	17.58	1.224	15	28	59.6	5.70	1.005 3852	92.2	7.65	0.87		22 47.7
3	9	34	46.91	1.220	15	26	43.0	5.68	1.005 1588	96.5	7.65	0.87		22 44.2
4	9	35	16.14	1.216	15	24	26.8	5.67	1.004 9222	100.7	7.66	0.87		22 40.8
5	9	35	45.26	+1.211	+15	22	10.9	-5.65	1.004 6756	-104.9	7.66	0.87		22 37.4
6	9	36	14.27	1.206	15	19	55.4	5.64	1.004 4188	109.1	7.67	0.87		22 33.9
7	9	36	43.16	1.201	15	17	40.3	5.62	1.004 1520	113.2	7.67	0.87		22 30.4
8	9	37	11.94	1.196	15	15	25.6	5.60	1.003 8753	117.4	7.68	0.87		22 27.0
9	9	37	40.58	1.191	15	13	11.4	5.58	1.003 5886	121.5	7.68	0.87		22 23.5
10	9	38	9.09	+1.185	+15	10	57.7	-5.56	1.003 2921	-125.6	7.69	0.87		22 20.1
11	9	38	37.47	1.179	15	8	44.5	5.54	1.002 9857	129.7	7.69	0.87		22 16.6
12	9	39	5.70	1.173	15	6	31.8	5.52	1.002 6695	133.8	7.70	0.87		22 13.1
13	9	39	33.79	1.167	15	4	19.7	5.49	1.002 3436	137.8	7.70	0.88		22 9.7
14	9	40	1.73	1.161	15	2	8.2	5.47	1.002 0079	141.9	7.71	0.88		22 6.2
15	9	40	29.52	+1.155	+14	59	57.3	-5.44	1.001 6625	-145.9	7.72	0.88		22 2.7
16	9	40	57.15	1.148	14	57	47.0	5.41	1.001 3076	149.9	7.72	0.88		21 59.2
17	9	41	24.62	1.141	14	55	37.4	5.39	1.000 9431	153.8	7.73	0.88		21 55.8
18	9	41	51.93	1.134	14	53	28.4	5.36	1.000 5692	157.8	7.74	0.88		21 52.3
19	9	42	19.07	1.127	14	51	20.1	5.33	1.000 1858	161.7	7.74	0.88		21 48.8
20	9	42	46.04	+1.120	+14	49	12.6	-5.30	0.999 7930	-165.6	7.75	0.88		21 45.3
21	9	43	12.84	1.113	14	47	5.9	5.26	0.999 3909	169.5	7.76	0.88		21 41.8
22	9	43	39.46	1.106	14	44	59.9	5.23	0.998 9795	173.3	7.76	0.88		21 38.4
23	9	44	5.90	1.098	14	42	54.7	5.20	0.998 5589	177.2	7.77	0.88		21 34.9
24	9	44	32.15	1.090	14	40	50.4	5.16	0.998 1291	181.0	7.78	0.88		21 31.4
25	9	44	58.21	+1.082	+14	38	46.9	-5.13	0.997 6900	-184.9	7.79	0.88		21 27.9
26	9	45	24.08	1.074	14	36	44.3	5.09	0.997 2417	188.7	7.80	0.89		21 24.3
27	9	45	49.74	1.065	14	34	42.5	5.05	0.996 7844	192.4	7.80	0.89		21 20.8
28	9	46	15.20	1.056	14	32	41.7	5.01	0.996 3180	196.2	7.81	0.89		21 17.3
29	9	46	40.45	1.048	14	30	41.9	4.97	0.995 8426	199.9	7.82	0.89		21 13.8
30	9	47	5.49	+1.039	+14	28	43.1	-4.93	0.995 3583	-203.6	7.83	0.89		21 10.3
st. 1	9	47	30.31	+1.030	+14	26	45.3	-4.89	0.994 8652	-207.3	7.84	0.89		21 6.8

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ' "	"			"	"	h m
Oct.	1	9 47 30.31	+1.030	+14 26 45.3	-4.89	0.994 8652	-207.3	7.84	0.89	21 6.8
	2	9 47 54.91	1.020	14 24 48.5	4.84	0.994 3633	210.9	7.85	0.89	21 3.2
	3	9 48 19.28	1.011	14 22 52.9	4.79	0.993 8527	214.5	7.86	0.89	20 59.7
	4	9 48 43.42	1.001	14 20 58.4	4.75	0.993 3335	218.1	7.87	0.89	20 56.2
	5	9 49 7.32	0.991	14 19 4.9	4.70	0.992 8057	221.7	7.88	0.89	20 52.6
	6	9 49 30.99	+0.981	+14 17 12.7	-4.65	0.992 2695	-225.2	7.89	0.90	20 49.1
	7	9 49 54.40	0.970	14 15 21.7	4.60	0.991 7249	228.6	7.89	0.90	20 45.5
	8	9 50 17.57	0.960	14 13 31.9	4.55	0.991 1720	232.1	7.90	0.90	20 42.0
	9	9 50 40.49	0.950	14 11 43.4	4.50	0.990 6110	235.4	7.91	0.90	20 38.4
	10	9 51 3.15	0.939	14 9 56.1	4.44	0.990 0420	238.7	7.93	0.90	20 34.9
	11	9 51 25.54	+0.928	+14 8 10.2	-4.39	0.989 4650	-242.0	7.94	0.90	20 31.3
	12	9 51 47.67	0.916	14 6 25.6	4.33	0.988 8802	245.3	7.95	0.90	20 27.7
	13	9 52 9.52	0.905	14 4 42.3	4.27	0.988 2877	248.5	7.96	0.90	20 24.2
	14	9 52 31.10	0.893	14 3 0.4	4.21	0.987 6876	251.6	7.97	0.91	20 20.6
	15	9 52 52.40	0.882	14 1 20.0	4.15	0.987 0800	254.7	7.98	0.91	20 17.0
	16	9 53 13.42	+0.870	+13 59 41.0	-4.10	0.986 4651	-257.8	7.99	0.91	20 13.4
	17	9 53 34.16	0.858	13 58 3.4	4.04	0.985 8428	260.8	8.00	0.91	20 9.8
	18	9 53 54.60	0.846	13 56 27.3	3.97	0.985 2134	263.7	8.01	0.91	20 6.2
	19	9 54 14.76	0.834	13 54 52.7	3.91	0.984 5770	266.6	8.03	0.91	20 2.6
	20	9 54 34.62	0.821	13 53 19.6	3.85	0.983 9337	269.5	8.04	0.91	19 59.0
	21	9 54 54.17	+0.808	+13 51 48.1	-3.79	0.983 2835	-272.3	8.05	0.91	19 55.4
	22	9 55 13.42	0.796	13 50 18.1	3.72	0.982 6267	275.1	8.06	0.92	19 51.8
	23	9 55 32.37	0.783	13 48 49.8	3.65	0.981 9632	277.8	8.07	0.92	19 48.2
	24	9 55 51.01	0.770	13 47 23.1	3.58	0.981 2932	280.5	8.09	0.92	19 44.5
	25	9 56 9.33	0.757	13 45 58.0	3.51	0.980 6167	283.2	8.10	0.92	19 40.9
	26	9 56 27.33	+0.743	+13 44 34.7	-3.44	0.979 9340	-285.8	8.11	0.92	19 37.3
	27	9 56 45.00	0.730	13 43 13.0	3.36	0.979 2451	288.3	8.13	0.92	19 33.6
	28	9 57 2.35	0.716	13 41 53.2	3.29	0.978 5502	290.8	8.14	0.93	19 30.0
	29	9 57 19.36	0.702	13 40 35.1	3.22	0.977 8495	293.2	8.15	0.93	19 26.3
	30	9 57 36.04	0.688	13 39 18.8	3.14	0.977 1430	295.5	8.16	0.93	19 22.7
	31	9 57 52.37	+0.673	+13 38 4.3	-3.06	0.976 4310	-297.8	8.18	0.93	19 19.0
Nov.	1	9 58 8.36	0.659	13 36 51.7	2.99	0.975 7136	300.0	8.19	0.93	19 15.3
	2	9 58 23.99	0.644	13 35 40.9	2.91	0.974 9910	302.1	8.21	0.93	19 11.6
	3	9 58 39.27	0.629	13 34 32.0	2.83	0.974 2634	304.2	8.22	0.93	19 7.9
	4	9 58 54.19	0.614	13 33 25.1	2.75	0.973 5309	306.2	8.23	0.94	19 4.3
	5	9 59 8.75	+0.599	+13 32 20.1	-2.67	0.972 7937	-308.1	8.25	0.94	19 0.6
	6	9 59 22.95	0.584	13 31 17.1	2.58	0.972 0521	309.9	8.26	0.94	18 56.9
	7	9 59 36.77	0.568	13 30 16.1	2.50	0.971 3061	311.7	8.27	0.94	18 53.2
	8	9 59 50.23	0.553	13 29 17.1	2.42	0.970 5560	313.4	8.29	0.94	18 49.5
	9	10 0 3.31	0.537	13 28 20.1	2.33	0.969 8019	315.0	8.30	0.94	18 45.8
	10	10 0 16.01	+0.521	+13 27 25.2	-2.25	0.969 0440	-316.5	8.32	0.95	18 42.0
	11	10 0 28.33	0.505	13 26 32.3	2.16	0.968 2826	317.9	8.33	0.95	18 38.3
	12	10 0 40.27	0.489	13 25 41.4	2.08	0.967 5179	319.3	8.35	0.95	18 34.6
	13	10 0 51.82	0.473	13 24 52.7	1.99	0.966 7501	320.5	8.36	0.95	18 30.8
	14	10 1 2.99	0.457	13 24 6.1	1.90	0.965 9793	321.7	8.38	0.95	18 27.1
	15	10 1 13.76	+0.441	+13 23 21.7	-1.81	0.965 2057	-322.9	8.39	0.95	18 23.3
	16	10 1 24.14	+0.424	+13 22 39.4	-1.72	0.964 4296	-323.9	8.41	0.96	18 19.5

SATURN, 1918.

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GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.		
		Noon.				Noon.									Noon.	
		h	m	s	s	°	'	"	"			"	"	h	m	
Jan.	2	21	36	11.52	+11.110	-15	1	32.3	+56.02	1.316 6720	+2352.8	1.62	0.42	2	50.5	
	6	21	36	56.86	11.554	14	57	43.6	58.26	1.317 5746	2159.5	1.61	0.42	2	35.5	
	10	21	37	43.89	11.955	14	53	46.5	60.30	1.318 3984	1967.1	1.61	0.42	2	20.6	
	14	21	38	32.44	12.311	14	49	41.5	62.14	1.319 1392	1745.9	1.61	0.42	2	5.7	
	18	21	39	22.32	12.621	14	45	29.7	63.74	1.319 7943	1529.1	1.61	0.42	1	50.8	
Feb.	22	21	40	13.35	+12.884	-14	41	11.9	+65.11	1.320 3619	+1308.1	1.60	0.42	1	35.9	
	26	21	41	5.33	13.101	14	36	49.1	66.28	1.320 8403	1083.2	1.60	0.42	1	21.0	
	30	21	41	58.10	13.276	14	32	22.0	67.24	1.321 2281	855.5	1.60	0.42	1	6.2	
	3	21	42	51.48	13.406	14	27	51.5	68.00	1.321 5243	624.5	1.60	0.42	0	51.3	
	7	21	43	45.29	13.491	14	23	18.3	68.51	1.321 7274	391.0	1.60	0.42	0	36.5	
	11	21	44	39.35	+13.530	-14	18	43.7	+68.78	1.321 8369	+ 156.3	1.60	0.42	0	21.7	
	15	21	45	33.47	13.522	14	14	8.4	68.81	1.321 8523	- 79.2	1.60	0.42	0	6.8	
	19	21	46	27.45	13.461	14	9	33.5	68.60	1.321 7737	312.8	1.60	0.42	23	48.3	
	23	21	47	21.10	13.359	14	4	59.9	68.15	1.321 6025	543.4	1.60	0.42	23	33.5	
	27	21	48	14.26	13.215	14	0	28.6	67.49	1.321 3394	770.8	1.60	0.42	23	18.6	
Mar.	3	21	49	6.76	+13.028	-13	56	0.3	+66.61	1.320 9863	- 995.1	1.60	0.42	23	3.7	
	7	21	49	58.43	12.803	13	51	36.0	65.50	1.320 5437	1216.6	1.60	0.42	22	48.8	
	11	21	50	49.12	12.533	13	47	16.6	64.16	1.320 0135	1433.8	1.60	0.42	22	33.9	
	15	21	51	38.63	12.218	13	43	3.0	62.58	1.319 3974	1645.8	1.61	0.42	22	19.0	
	19	21	52	26.80	11.860	13	38	56.3	60.75	1.318 6980	1849.4	1.61	0.42	22	4.1	
	23	21	53	13.46	+11.468	-13	34	57.3	+58.73	1.317 9191	-2043.9	1.61	0.42	21	49.2	
	27	21	53	58.49	11.040	13	31	6.8	56.50	1.317 0639	2231.0	1.62	0.42	21	34.2	
	31	21	54	41.73	10.576	13	27	25.5	54.12	1.316 1354	2409.6	1.62	0.42	21	19.2	
	Apr.	4	21	55	23.06	10.084	13	23	54.1	51.54	1.315 1373	2680.0	1.62	0.43	21	4.1
		8	21	56	2.35	9.555	13	20	33.5	48.71	1.314 0727	2741.1	1.63	0.43	20	49.0
12		21	56	39.45	+ 8.989	-13	17	24.6	+45.73	1.312 9460	-2890.2	1.63	0.43	20	33.9	
16		21	57	14.22	8.394	13	14	27.9	42.58	1.311 7622	3026.9	1.63	0.43	20	18.7	
20		21	57	46.57	7.775	13	11	44.2	39.26	1.310 5262	3151.0	1.64	0.43	20	3.5	
May	24	21	58	16.39	7.132	13	9	14.0	35.81	1.309 2432	3261.5	1.64	0.43	19	48.3	
	28	21	58	43.60	6.470	13	6	57.8	32.28	1.307 9187	3359.5	1.65	0.43	19	33.0	
	2	21	59	8.12	+ 5.788	-13	4	55.9	+28.63	1.306 5573	-3444.9	1.65	0.43	19	17.7	
	6	21	59	29.87	5.085	13	3	9.0	24.81	1.305 1647	3516.3	1.66	0.43	19	2.3	
	10	21	59	48.77	4.362	13	1	37.5	20.92	1.303 7463	3572.6	1.67	0.44	18	46.9	
	14	22	0	4.75	3.625	13	0	21.8	16.94	1.302 3088	3611.8	1.67	0.44	18	31.4	
	18	22	0	17.76	2.879	12	59	22.0	12.95	1.300 8590	3635.0	1.68	0.44	18	15.9	
	22	22	0	27.78	+ 2.131	-12	58	38.2	+ 8.92	1.299 4030	-3641.5	1.68	0.44	18	0.3	
	26	22	0	34.81	1.382	12	58	10.6	4.89	1.297 9479	3632.4	1.69	0.44	17	44.7	
	30	22	0	38.84	+ 0.630	12	57	59.1	+ 0.86	1.296 4991	3608.5	1.69	0.44	17	29.0	
June	3	22	0	39.85	- 0.124	12	58	3.7	- 3.16	1.295 0634	3567.4	1.70	0.45	17	13.3	
	7	22	0	37.86	0.871	12	58	24.4	7.19	1.293 6475	3509.2	1.70	0.45	16	57.5	
	11	22	0	32.89	- 1.612	-12	59	1.1	-11.13	1.292 2584	-3433.1	1.71	0.45	16	41.7	
	15	22	0	24.98	2.339	12	59	53.3	14.95	1.290 9034	3339.0	1.71	0.45	16	25.9	
	19	22	0	14.21	3.044	13	1	0.6	18.68	1.289 5894	3228.8	1.72	0.45	16	9.9	
July	23	22	0	0.66	3.726	13	2	22.5	22.25	1.288 3225	3102.9	1.73	0.45	15	54.0	
	27	21	59	44.43	4.386	13	3	58.4	25.68	1.287 1091	2961.9	1.73	0.45	15	38.0	
	1	21	59	25.60	- 5.022	-13	5	47.7	-28.96	1.285 9550	-2806.0	1.74	0.46	15	21.9	
	5	21	59	4.29	- 5.631	-13	7	49.9	-32.09	1.284 8664	-2633.9	1.74	0.46	15	5.8	

URANUS, 1918.
GREENWICH MEAN TIME.

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	"	"	° ' "	"		
Jan.	0	323 13 47.4	38.97	+6.1	−0 43 27.2	−0.18	1.300 8489	+16.5
	10	323 20 17.1	38.97	6.1	0 43 29.0	0.18	1.300 8654	16.4
	20	323 26 46.8	38.97	6.0	0 43 30.8	0.18	1.300 8817	16.3
	30	323 33 16.5	38.96	+6.0	−0 43 32.6	−0.18	1.300 8980	+16.3
Feb.	9	323 39 46.1	38.96	6.0	0 43 34.4	0.18	1.300 9143	16.3
	19	323 46 15.7	38.96	5.9	0 43 36.1	0.18	1.300 9305	16.2
Mar.	1	323 52 45.2	38.95	+5.9	−0 43 37.9	−0.18	1.300 9466	+16.1
	11	323 59 14.7	38.95	5.9	0 43 39.6	0.18	1.300 9627	16.0
	21	324 5 44.2	38.94	5.9	0 43 41.4	0.18	1.300 9787	16.0
	31	324 12 13.6	38.94	+5.9	−0 43 43.1	−0.18	1.300 9947	+16.0
Apr.	10	324 18 43.0	38.94	5.8	0 43 44.9	0.18	1.301 0106	15.9
	20	324 25 12.3	38.93	5.8	0 43 46.6	0.17	1.301 0264	15.8
	30	324 31 41.6	38.93	+5.8	−0 43 48.3	−0.17	1.301 0422	+15.7
May	10	324 38 10.9	38.92	5.7	0 43 50.0	0.17	1.301 0579	15.6
	20	324 44 40.1	38.92	5.7	0 43 51.7	0.17	1.301 0735	15.6
	30	324 51 9.3	38.92	+5.7	−0 43 53.3	−0.17	1.301 0891	+15.6
June	9	324 57 38.4	38.91	5.6	0 43 55.0	0.17	1.301 1046	15.5
	19	325 4 7.5	38.91	5.6	0 43 56.7	0.17	1.301 1201	15.4
	29	325 10 36.6	38.91	+5.6	−0 43 58.4	−0.16	1.301 1355	+15.4
July	9	325 17 5.7	38.90	5.6	0 44 0.0	0.16	1.301 1508	15.3
	19	325 23 34.7	38.90	5.5	0 44 1.6	0.16	1.301 1661	15.2
	29	325 30 3.6	38.89	+5.5	−0 44 3.2	−0.16	1.301 1813	+15.2
Aug.	8	325 36 32.5	38.89	5.5	0 44 4.8	0.16	1.301 1965	15.2
	18	325 43 1.4	38.89	5.4	0 44 6.4	0.16	1.301 2116	15.0
	28	325 49 30.3	38.88	+5.4	−0 44 8.0	−0.16	1.301 2266	+15.0
Sept.	7	325 55 59.1	38.88	5.4	0 44 9.6	0.16	1.301 2416	15.0
	17	326 2 27.9	38.88	5.4	0 44 11.2	0.16	1.301 2565	14.9
	27	326 8 56.6	38.87	+5.3	−0 44 12.8	−0.16	1.301 2714	+14.8
Oct.	7	326 15 25.3	38.87	5.3	0 44 14.4	0.15	1.301 2862	14.8
	17	326 21 54.0	38.87	5.3	0 44 15.9	0.15	1.301 3010	14.8
	27	326 28 22.7	38.86	+5.2	−0 44 17.4	−0.15	1.301 3157	+14.7
Nov.	6	326 34 51.3	38.86	5.2	0 44 18.9	0.15	1.301 3303	14.6
	16	326 41 19.9	38.86	5.2	0 44 20.4	0.15	1.301 3449	14.6
	26	326 47 48.4	38.85	+5.2	−0 44 21.9	−0.15	1.301 3594	+14.5
Dec.	6	326 54 16.9	38.84	5.1	0 44 23.4	0.15	1.301 3739	14.5
	16	327 0 45.8	38.84	5.1	0 44 24.9	0.15	1.301 3884	14.4
	26	327 7 13.8	38.84	+5.1	−0 44 26.4	−0.15	1.301 4027	+14.3
	36	327 13 42.2	38.84	+5.0	−0 44 27.9	−0.15	1.301 4170	+14.2

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
		Noon.				Noon.									
		h	m	s	s	°	'	"	"						
July	1	8	32	27.59	+8.302	+18	42	44.4	-29.10	1.490 5725	+1075.9	1.25	0.28	1 57.2	
	5	8	33	1.22	8.506	18	40	46.2	29.98	1.490 9749	935.9	1.25	0.28	1 42.1	
	9	8	33	35.60	8.680	18	38	44.8	30.71	1.491 3207	791.7	1.25	0.28	1 26.9	
	13	8	34	10.63	8.826	18	36	40.6	31.36	1.491 6079	644.4	1.25	0.28	1 11.8	
	17	8	34	46.16	8.936	18	34	34.0	31.91	1.491 8359	494.6	1.25	0.28	0 56.6	
	21	8	35	22.09	+9.021	+18	32	25.4	-32.35	1.492 0035	+ 344.1	1.24	0.28	0 41.5	
	25	8	35	58.28	9.071	18	30	15.4	32.66	1.492 1111	192.9	1.24	0.28	0 26.4	
	29	8	36	34.62	9.095	18	28	4.1	32.90	1.492 1576	+ 40.0	1.24	0.28	0 11.2	
	Aug.	2	8	37	11.01	9.092	18	25	52.2	33.01	1.492 1430	- 113.9	1.24	0.28	23 52.3
		6	8	37	47.31	9.054	18	23	40.0	33.01	1.492 0665	268.0	1.24	0.28	23 37.2
	10	8	38	23.40	+8.985	+18	21	28.1	-32.90	1.491 9287	- 421.1	1.25	0.28	23 22.0	
	14	8	38	59.15	8.884	18	19	16.9	32.65	1.491 7298	573.1	1.25	0.28	23 6.9	
	18	8	39	34.42	8.749	18	17	7.1	32.25	1.491 4706	722.1	1.25	0.28	22 51.8	
	22	8	40	9.10	8.588	18	14	58.9	31.81	1.491 1525	868.4	1.25	0.28	22 36.6	
	26	8	40	43.08	8.399	18	12	52.8	31.22	1.490 7763	1011.8	1.25	0.28	22 21.5	
Sept.	30	8	41	16.26	+8.184	+18	10	49.2	-30.52	1.490 3434	-1153.5	1.25	0.28	22 6.3	
	3	8	41	48.51	7.935	18	8	48.8	29.66	1.489 8540	1291.6	1.25	0.28	21 51.1	
	7	8	42	19.70	7.656	18	6	52.0	28.71	1.489 3108	1423.8	1.25	0.28	21 35.9	
	11	8	42	49.72	7.349	18	4	59.2	27.64	1.488 7156	1551.5	1.25	0.29	21 20.6	
	15	8	43	18.45	7.014	18	3	11.1	26.41	1.488 0704	1672.9	1.26	0.29	21 5.4	
	19	8	43	45.80	+6.656	+18	1	27.9	-25.15	1.487 3782	-1787.2	1.26	0.29	20 50.1	
	23	8	44	11.67	6.276	17	59	50.0	23.78	1.486 6415	1895.1	1.26	0.29	20 34.8	
	27	8	44	35.99	5.871	17	58	17.9	22.26	1.485 8630	1996.3	1.26	0.29	20 19.5	
	Oct.	1	8	44	58.61	5.440	17	56	52.1	20.64	1.485 0454	2090.4	1.27	0.29	20 4.1
		5	8	45	19.49	4.987	17	55	32.9	18.94	1.484 1918	2175.8	1.27	0.29	19 48.7
	9	8	45	38.51	+4.516	+17	54	20.8	-17.12	1.483 3061	-2251.2	1.27	0.29	19 33.3	
	13	8	45	55.60	4.028	17	53	16.0	15.26	1.482 3921	2316.9	1.27	0.29	19 17.9	
	17	8	46	10.71	3.524	17	52	18.8	13.32	1.481 4540	2371.9	1.28	0.29	19 2.4	
	21	8	46	23.77	3.005	17	51	29.5	11.31	1.480 4959	2417.0	1.28	0.29	18 46.9	
	25	8	46	34.74	2.478	17	50	48.4	9.25	1.479 5217	2452.5	1.28	0.29	18 31.3	
	29	8	46	43.58	+1.939	+17	50	15.5	- 7.16	1.478 5354	-2476.9	1.28	0.29	18 15.7	
	Nov.	2	8	46	50.23	1.388	17	49	51.2	4.99	1.477 5418	2499.1	1.29	0.29	18 0.1
		6	8	46	54.67	0.832	17	49	35.6	2.81	1.476 5458	2488.4	1.29	0.29	17 44.5
	10	8	46	56.88	+0.275	17	49	28.7	- 0.64	1.475 5527	2475.5	1.29	0.29	17 28.8	
	14	8	46	56.87	-0.279	17	49	30.5	+ 1.55	1.474 5670	2450.4	1.30	0.29	17 13.0	
	18	8	46	54.65	-0.829	+17	49	41.1	+ 3.72	1.473 5940	-2412.9	1.30	0.30	16 57.2	
	22	8	46	50.25	1.371	17	50	0.2	5.84	1.472 6382	2364.3	1.30	0.30	16 41.4	
	26	8	46	43.69	1.906	17	50	27.8	7.94	1.471 7043	2302.9	1.30	0.30	16 25.6	
	30	8	46	35.01	2.431	17	51	3.7	10.00	1.470 7976	2228.6	1.31	0.30	16 9.7	
	Dec.	4	8	46	24.25	2.944	17	51	47.8	12.01	1.469 9230	2142.1	1.31	0.30	15 53.8
8		8	46	11.48	-3.435	+17	52	39.7	+13.95	1.469 0855	-2043.5	1.31	0.30	15 37.8	
	12	8	45	56.81	3.898	17	53	39.0	15.72	1.468 2898	1932.8	1.32	0.30	15 21.9	
	16	8	45	40.33	4.338	17	54	45.4	17.45	1.467 5407	1811.8	1.32	0.30	15 5.9	
	20	8	45	22.14	4.751	17	55	58.4	19.07	1.466 8416	1682.0	1.32	0.30	14 49.9	
	24	8	45	2.36	5.137	17	57	17.5	20.50	1.466 1964	1542.1	1.32	0.30	14 33.8	
	28	8	44	41.09	-5.490	+17	58	42.2	+21.84	1.465 6091	-1393.1	1.32	0.30	14 17.7	
	32	8	44	18.49	...	+18	0	12.1	...	1.465 0830	...	1.32	0.30	14 1.6	

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	"	"	° ' "	"		
Jan.	0	125 33 23.3	21.75	-9.2	-0 9 52.9	+0.67	1.477 6316	+4.7
	10	125 37 0.8	21.75	9.1	0 9 46.2	0.67	1.477 6362	4.6
	20	125 40 38.3	21.75	9.0	0 9 39.5	0.67	1.477 6409	4.6
Feb.	30	125 44 15.8	21.75	-8.9	-0 9 32.8	+0.67	1.477 6455	+4.6
	9	125 47 53.3	21.75	8.8	0 9 26.1	0.67	1.477 6502	4.6
	19	125 51 30.8	21.75	8.7	0 9 19.4	0.67	1.477 6548	4.6
Mar.	1	125 55 8.3	21.75	-8.5	-0 9 12.7	+0.67	1.477 6594	+4.6
	11	125 58 45.8	21.75	8.5	0 9 6.0	0.67	1.477 6640	4.6
	21	126 2 23.3	21.75	8.4	0 8 59.3	0.67	1.477 6686	4.6
Apr.	31	126 6 0.9	21.75	-8.3	-0 8 52.6	+0.67	1.477 6732	+4.6
	10	126 9 38.4	21.75	8.2	0 8 45.9	0.67	1.477 6778	4.5
	20	126 13 15.9	21.75	8.1	0 8 39.2	0.67	1.477 6823	4.5
May	30	126 16 53.4	21.75	-8.0	-0 8 32.5	+0.67	1.477 6869	+4.5
	10	126 20 30.9	21.75	7.9	0 8 25.8	0.67	1.477 6914	4.5
	20	126 24 8.4	21.75	7.8	0 8 19.1	0.67	1.477 6959	4.5
June	30	126 27 45.9	21.75	-7.7	-0 8 12.4	+0.67	1.477 7004	+4.5
	9	126 31 23.4	21.75	7.5	0 8 5.7	0.67	1.477 7049	4.5
	19	126 35 0.9	21.75	7.4	0 7 59.0	0.67	1.477 7094	4.5
July	29	126 38 38.5	21.75	-7.3	-0 7 52.3	+0.67	1.477 7139	+4.5
	9	126 42 16.0	21.75	7.2	0 7 45.6	0.67	1.477 7184	4.5
	19	126 45 53.6	21.75	7.1	0 7 38.9	0.67	1.477 7229	4.5
Aug.	29	126 49 31.1	21.75	-7.0	-0 7 32.2	+0.67	1.477 7274	+4.5
	8	126 53 8.6	21.75	6.9	0 7 25.5	0.67	1.477 7319	4.4
	18	126 56 46.1	21.75	6.8	0 7 18.8	0.67	1.477 7363	4.4
Sept.	28	127 0 23.6	21.75	-6.7	-0 7 12.1	+0.67	1.477 7407	+4.4
	7	127 4 1.1	21.75	6.6	0 7 5.4	0.67	1.477 7451	4.4
	17	127 7 38.6	21.75	6.5	0 6 58.7	0.67	1.477 7495	4.4
Oct.	27	127 11 16.1	21.75	-6.4	-0 6 52.0	+0.67	1.477 7539	+4.4
	7	127 14 53.6	21.75	6.3	0 6 45.3	0.67	1.477 7583	4.4
	17	127 18 31.2	21.75	6.2	0 6 38.6	0.67	1.477 7627	4.4
Nov.	27	127 22 8.7	21.75	-6.1	-0 6 31.9	+0.67	1.477 7671	+4.3
	6	127 25 46.2	21.75	6.0	0 6 25.2	0.67	1.477 7714	4.3
	16	127 29 23.7	21.75	5.9	0 6 18.5	0.67	1.477 7757	4.3
Dec.	26	127 33 1.2	21.75	-5.8	-0 6 11.8	+0.67	1.477 7800	+4.3
	6	127 36 38.7	21.75	5.7	0 6 5.1	0.67	1.477 7843	4.3
	16	127 40 16.2	21.75	5.6	0 5 58.4	0.67	1.477 7886	4.3
	26	127 43 53.7	21.75	-5.5	-0 5 51.7	+0.67	1.477 7929	+4.3
	36	127 47 31.3	21.75	-5.4	-0 5 45.0	+0.67	1.477 7972	+4.3

PART II.

**ASTRONOMICAL EPHEMERIS FOR THE
MERIDIAN OF WASHINGTON.**

200 FORMULÆ FOR THE REDUCTION OF STARS, 1918.

The constants of precession, nutation and aberration adopted by the *Conférence Internationale des Étoiles Fondamentales* which met in Paris in May, 1896, are given on page xvi, and together with the notation of BESSEL are used in the formulæ which follow.

BESSELIAN STAR-NUMBERS.

<i>Terms of Long Period.</i>	<i>Terms of Short Period.</i>
$A-\tau-0.342\ 21 \sin \Omega$	$-0.004\ 05 \sin 2 \mathfrak{C}$
$+0.004\ 15 \sin 2 \Omega$	$+0.000\ 23 \sin (\mathfrak{C} + \Gamma')$
$-0.025\ 26 \sin 2 L$	$+0.001\ 34 \sin (\mathfrak{C} - \Gamma')$
$+0.002\ 51 \sin (L - \Gamma)$	$-0.000\ 68 \sin (2 \mathfrak{C} - \Omega)$
$-0.000\ 99 \sin (3 L - \Gamma)$	$-0.000\ 52 \sin (3 \mathfrak{C} - \Gamma')$
$+0.000\ 42 \sin (L + \Gamma)$	$+0.000\ 30 \sin (\mathfrak{C} - 2 L + \Gamma')$
$+0.000\ 25 \sin (2 L - \Omega)$	$+0.000\ 12 \sin 2 (\mathfrak{C} - L)$
"	"
$B- -9.210 \cos \Omega$	$-0.088 \cos 2 \mathfrak{C}$
$+0.090 \cos 2 \Omega$	$-0.018 \cos (2 \mathfrak{C} - \Omega)$
$-0.551 \cos 2 L$	$-0.011 \cos (3 \mathfrak{C} - \Gamma')$
$-0.022 \cos (3 L - \Gamma)$	$+0.005 \cos (\mathfrak{C} + \Gamma')$
$+0.009 \cos (L + \Gamma)$	
$+0.007 \cos (2 L - \Omega)$	
$C- -20.4700 \cos \omega \cos \odot$	
$D- -20.4700 \sin \odot$	
$E- -0.0415 \sin \Omega + 0''.0005 \sin 2 \Omega - 0''.0031 \sin 2 L$	

BESSEL'S Star-Constants.

$a=3^s.072\ 67 + 1^s.336\ 36 \sin \alpha_0 \tan \delta_0$	$a' = 20''.0453 \cos \alpha_0$
$b = \frac{1}{15} \cos \alpha_0 \tan \delta_0$	$b' = -\sin \alpha_0$
$c = \frac{1}{15} \cos \alpha_0 \sec \delta_0$	$c' = \tan \omega \cos \delta_0 - \sin \alpha_0 \sin \delta_0$
$d = \frac{1}{15} \sin \alpha_0 \sec \delta_0$	$d' = \cos \alpha_0 \sin \delta_0$

Formulæ for Reduction to Apparent Position.

$$\begin{aligned}\alpha &= \alpha_0 + \tau\mu + Aa + Bb + Cc + Dd + \frac{1}{15}E & (\text{in time}) \\ \delta &= \delta_0 + \tau\mu' + Aa' + Bb' + Cc' + Dd' & (\text{in arc})\end{aligned}$$

INDEPENDENT STAR-NUMBERS.

$$\begin{aligned}f + f' &= +46''.0900 A + E & (\text{in arc}) \\ &= +3^s.07267 A + \frac{1}{15}E & (\text{in time}) \\ f' &= -0^s.0124 \sin 2 \mathfrak{C} + 0^s.0041 \sin (\mathfrak{C} - \Gamma') + 0^s.0007 \sin (\mathfrak{C} + \Gamma') \\ &\quad - 0^s.0021 \sin (2 \mathfrak{C} - \Omega) - 0^s.0016 \sin (3 \mathfrak{C} - \Gamma') \\ &\quad + 0^s.0009 \sin (\mathfrak{C} - 2 L + \Gamma') + 0^s.0004 \sin 2 (\mathfrak{C} - L) \\ g \sin G &= B & h \sin H &= C & i &= C \tan \omega \\ g \cos G &= 20''.0453 A & h \cos H &= D\end{aligned}$$

Formulæ for Reduction to Apparent Position.

$$\begin{aligned}\alpha &= \alpha_0 + f + f' + \tau\mu + \frac{1}{15}g \sin (G + \alpha_0) \tan \delta_0 + \frac{1}{15}h \sin (H + \alpha_0) \sec \delta_0 & (\text{in time}) \\ \delta &= \delta_0 + \tau\mu' + g \cos (G + \alpha_0) + h \cos (H + \alpha_0) \sin \delta_0 + i \cos \delta_0 & (\text{in arc})\end{aligned}$$

In the above formulæ,

τ denotes the time reckoned in units of one year, from the beginning of the Besselian fictitious year (1918, January 0^d.459, Washington mean time),

α_0, δ_0 , the star's mean R. A. and Decl. at the beginning of the fictitious year,
 α, δ , the star's apparent right ascension and declination at the time τ ,
 μ, μ' , the annual proper motion in right ascension and declination,

\odot , the Sun's true longitude,
 L , the Sun's mean longitude,
 Ω , the longitude of the Moon's
ascending node,

ω , the obliquity of the ecliptic,
 Γ , the long. of the Sun's perigee,
 Γ' , the long. of the Moon's perigee,
 \mathfrak{C} , the Moon's mean longitude.

The independent star-numbers are more convenient than BESSEL'S when only one or two apparent positions of a star are required, or when BESSEL'S star-constants are not known with sufficient accuracy.

In using the star-constants of the *British Association Catalogue*, $a, b, c, d, a', b', c', d'$, with the star-numbers of this Ephemeris, the quantities to be computed are $Ac, Bd, Ca, Db, -Ac', -Bd', -Ca', -Db'$.

In the computation of the Besselian star-numbers given for Washington mean midnight of each day of the year, on pages 202–205, the short-period terms—that is, the terms involving the Moon's mean longitude—have been included.

In the computation of the independent star-numbers, pages 206–213, the short-period terms have been included in the two columns headed G and $\text{Log } g$. The quantities f and f' give separately the effect of the long-period and short-period terms. f' differs but slightly from the quantity $-0''.1866 \sin 2 \zeta + 0''.0622 \sin (\zeta - I')$ given on page 37 of the *Procès-Verbaux* of the Paris Conference of 1896, which quantity that conference decided should be omitted in the reduction of stars from mean to apparent place.

In computing the ephemerides of the circumpolar stars in this volume, all short-period terms have been included. The quantity f' , which was omitted from the ephemerides of the circumpolar stars given in the *American Ephemeris and Nautical Almanac* for the years 1900 to 1915, inclusive, is now included in these ephemerides in accordance with the decision of the *Congrès International des Éphémérides Astronomiques* held in Paris in October, 1911. See page 43 of *Procès-Verbaux* of that Congress.

In the computation of the ephemerides of the ten-day stars, no short-period terms have been included. These terms attain two maxima and two minima during the tropical month. At maximum and minimum they may amount in right ascension to $\pm 0''.008 \tan \delta$, and in declination to $\pm 0''.13$. For computing the effect of these terms for the correction of the positions of stars interpolated from the ten-day ephemerides, the following formulæ may be used, in which $\Delta\alpha$ and $\Delta\delta$ denote the effect of the short-period terms in right ascension and declination, respectively, and $\delta''\psi$ and $\delta''\omega$, the sum of the short-period terms of the nutation in longitude and obliquity:

$$\begin{aligned}\Delta\alpha &= D_{\psi}\alpha \delta''\psi + D_{\omega}\alpha \delta''\omega \\ \Delta\delta &= D_{\psi}\delta \delta''\psi + D_{\omega}\delta \delta''\omega\end{aligned}$$

The values of $\delta''\psi$ and of $\delta''\omega$ for Washington mean midnight are given for each day of the year on pages 215–216, and have been computed as follows:

$$\delta''\psi = 50''.37 A_2 \qquad \delta''\omega = -B_2$$

in which A_2 and B_2 are the sums of the short-period terms given in the expressions for A and B on page 200.

The quantities $D_{\psi}\alpha$, $D_{\omega}\alpha$, $D_{\psi}\delta$, and $D_{\omega}\delta$ are given for each ten-day star on pages 316–513, and have been computed by means of the following formulæ:

$$\begin{aligned}D_{\psi}\alpha &= \frac{1}{15} (\cos \omega + \sin \alpha \tan \delta \sin \omega) & D_{\omega}\alpha &= -\frac{1}{15} \cos \alpha \tan \delta \\ D_{\psi}\delta &= \cos \alpha \sin \omega & D_{\omega}\delta &= \sin \alpha\end{aligned}$$

In the *Star List of the American Ephemeris* for the years 1910 and 1911 and in the *American Ephemeris and Nautical Almanac* for the years 1912 to 1915, inclusive, the value used for the derivative of the right ascension with reference to ψ was

$$D'_{\psi}\alpha = \frac{1}{15} \sin \alpha \tan \delta \sin \omega$$

and the addition of the term $\frac{1}{15} \cos \omega$ is made in accordance with the above-mentioned decision of the *Congrès International des Éphémérides Astronomiques* of 1911 with reference to the quantity f' .

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BESSELIAN STAR-NUMBERS, 1918.

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
Jan. 0	+9.54964	+9.3707	-0.51322	+1.30447	Feb. 15	+9.69099	-9.0224	-1.19598	+1.05027
1	9.55243	9.3232	0.55491	1.30304	16	9.69310	8.8344	1.20090	1.03838
2	9.55475	9.2971	0.59282	1.30146	17	9.69599	8.5514	1.20563	1.02602
3	9.55686	9.2984	0.62756	1.29975	18	9.69943	8.2175	1.21017	1.01316
h 4	9.55907	9.3270	0.65960	1.29788	h 19	9.70311	8.2304	1.21454	0.99979
(7.0) 5	+9.56171	+9.3755	-0.68931	+1.29587	(10.0) 20	+9.70662	-8.5752	-1.21872	+0.98586
6	9.56503	9.4310	0.71698	1.29372	21	9.70961	8.8704	1.22273	0.97133
7	9.56921	9.4834	0.74287	1.29141	22	9.71190	9.0752	1.22657	0.95617
8	9.57422	9.5247	0.76718	1.28895	23	9.71346	9.2151	1.23024	0.94033
9	9.58001	9.5480	0.79006	1.28634	24	9.71441	9.3064	1.23374	0.92376
10	+9.58629	+9.5495	-0.81167	+1.28358	25	+9.71491	-9.3614	-1.23709	+0.90640
11	9.59252	9.5254	0.83212	1.28065	26	9.71516	9.3858	1.24027	0.88819
12	9.59815	9.4739	0.85152	1.27758	27	9.71539	9.3829	1.24330	0.86905
13	9.60284	9.3957	0.86995	1.27434	28	9.71575	9.3560	1.24617	0.84890
14	9.60641	9.2973	0.88750	1.27094	Mar. 1	9.71646	9.3058	1.24888	0.82764
15	+9.60886	+9.1973	-0.90424	+1.26738	2	+9.71771	-9.2330	-1.25145	+0.80516
16	9.61055	9.1307	0.92021	1.26365	3	9.71953	9.1421	1.25387	0.78131
17	9.61207	9.1335	0.93549	1.25975	4	9.72194	9.0500	1.25615	0.75596
18	9.61396	9.1973	0.95011	1.25567	5	9.72487	8.9903	1.25825	0.72890
h 19	9.61665	9.2849	0.96411	1.25142	h 6	9.72803	9.0035	1.26026	0.69991
(8.0) 20	+9.62031	+9.3623	-0.97754	+1.24699	(11.0) 7	+9.73111	-9.0864	-1.26211	+0.66872
21	9.62485	9.4145	0.99044	1.24238	8	9.73378	9.1992	1.26381	0.63499
22	9.62991	9.4349	1.00282	1.23758	9	9.73578	9.3054	1.26537	0.59829
23	9.63507	9.4214	1.01473	1.23259	10	9.73698	9.3847	1.26680	0.55811
24	9.63987	9.3727	1.02618	1.22741	11	9.73754	9.4298	1.26809	0.51363
25	+9.64399	+9.2876	-1.03720	+1.22202	12	+9.73772	-9.4387	-1.26924	+0.46399
26	9.64726	9.1626	1.04781	1.21644	13	9.73791	9.4089	1.27026	0.40782
27	9.64970	8.9921	1.05804	1.21064	14	9.73849	9.3383	1.27115	0.34319
28	9.65147	8.7657	1.06789	1.20463	15	9.73977	9.2258	1.27190	0.26711
29	9.65274	8.4800	1.07739	1.19839	16	9.74180	9.0722	1.27252	0.17472
30	+9.65377	+8.1900	-1.08655	+1.19193	17	+9.74446	-8.8965	-1.27300	+0.05712
31	9.65485	8.1644	1.09538	1.18523	18	9.74743	8.7627	1.27336	9.89528
Feb. 1	9.65615	8.4133	1.10390	1.17829	19	9.75039	8.7536	1.27358	9.63440
2	9.65787	8.6674	1.11213	1.17110	20	9.75295	8.8639	1.27368	+8.88188
h 3	9.66023	8.8537	1.12006	1.16366	h 21	9.75494	9.0009	1.27364	-9.44456
(9.0) 4	+9.66330	+8.9764	-1.12772	+1.15595	(12.0) 22	+9.75630	-9.1139	-1.27347	-9.80110
5	9.66706	9.0378	1.13511	1.14796	23	9.75706	9.1898	1.27318	9.99403
6	9.67128	9.0366	1.14224	1.13969	24	9.75736	9.2279	1.27275	0.12700
7	9.67564	8.9518	1.14912	1.13112	25	9.75742	9.2294	1.27219	0.22849
8	9.67971	8.7143	1.15576	1.12224	26	9.75742	9.1923	1.27150	0.31055
9	+9.68314	+6.4771	-1.16216	+1.11304	27	+9.75754	-9.1058	-1.27069	-0.37939
10	9.68570	-8.7443	1.16833	1.10351	28	9.75795	8.9450	1.26974	0.43866
11	9.68735	9.0200	1.17428	1.09362	29	9.75879	-8.6117	1.26866	0.49065
12	9.68830	9.1377	1.18002	1.08337	30	9.76015	+7.9345	1.26745	0.53695
13	9.68891	9.1700	1.18554	1.07275	31	9.76206	8.7380	1.26610	0.57864
14	+9.68966	-9.1303	-1.19086	+1.06172	Apr. 1	+9.76448	+8.9576	-1.26463	-0.61654
15	+9.69099	-9.0224	-1.19598	+1.05027	2	+9.76720	+9.0457	-1.26302	-0.65126

FOR WASHINGTON MEAN MIDNIGHT.

Day. d. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
r. 1	+9.76448	+8.9576	-1.26463	-0.61654	May 17	+9.84443	+0.0238	-1.01611	-1.23199
2	9.76720	9.0457	1.26302	0.65126	18	9.84532	0.0260	1.00490	1.23674
3	9.76998	9.0542	1.26128	0.68328	19	9.84605	0.0338	0.99327	1.24132
4	9.77250	8.9965	1.25940	0.71296	20	9.84681	0.0469	0.98120	1.24572
h 5	9.77446	8.8745	1.25739	0.74061	h 21	9.84776	0.0640	0.96867	1.24996
L.O) 6	+9.77578	+8.7007	-1.25524	-0.76648	(16.0) 22	+9.84902	+0.0836	-0.95565	-1.25403
7	9.77650	8.5465	1.25295	0.79075	23	9.85066	0.1038	0.94210	1.25794
8	9.77678	8.5911	1.25052	0.81361	24	9.85273	0.1229	0.92799	1.26170
9	9.77699	8.8241	1.24795	0.83519	25	9.85523	0.1390	0.91329	1.26530
10	9.77748	9.0641	1.24524	0.85561	26	9.85807	0.1507	0.89796	1.26875
11	+9.77860	+9.2546	-1.24239	-0.87499	27	+9.86105	+0.1568	-0.88194	-1.27205
12	9.78044	9.3930	1.23939	0.89341	28	9.86399	0.1574	0.86519	1.27521
13	9.78295	9.4871	1.23624	0.91094	29	9.86662	0.1533	0.84764	1.27822
14	9.78586	9.5452	1.23295	0.92766	30	9.86876	0.1465	0.82923	1.28109
15	9.78886	9.5733	1.22950	0.94364	31	9.87035	0.1402	0.80989	1.28382
16	+9.79163	+9.5782	-1.22590	-0.95891	June 1	+9.87147	+0.1377	-0.78952	-1.28641
17	9.79391	9.5673	1.22215	0.97353	2	9.87231	0.1414	0.76802	1.28886
18	9.79561	9.5491	1.21823	0.98754	3	9.87321	0.1518	0.74528	1.29118
19	9.79672	9.5334	1.21416	1.00099	4	9.87443	0.1676	0.72116	1.29336
20	9.79742	9.5289	1.20993	1.01390	h 5	9.87618	0.1857	0.69550	1.29541
h 21	+9.79781	+9.5402	-1.20552	-1.02631	(17.0) 6	+9.87854	+0.2030	-0.66810	-1.29734
L.O) 22	9.79811	9.5687	1.20095	1.03824	7	9.88139	0.2166	0.63874	1.29913
23	9.79852	9.6104	1.19621	1.04973	8	9.88453	0.2247	0.60712	1.30079
24	9.79914	9.6596	1.19129	1.06079	9	9.88767	0.2272	0.57289	1.30233
25	9.80012	9.7110	1.18619	1.07145	10	9.89052	0.2248	0.53561	1.30374
26	+9.80160	+9.7597	-1.18090	-1.08173	11	+9.89294	+0.2192	-0.49471	-1.30502
27	9.80356	9.8022	1.17542	1.09164	12	9.89486	0.2126	0.44942	1.30618
28	9.80599	9.8353	1.16976	1.10120	13	9.89633	0.2070	0.39874	1.30722
29	9.80878	9.8579	1.16389	1.11044	14	9.89742	0.2042	0.34124	1.30813
30	9.81167	9.8689	1.15782	1.11935	15	9.89835	0.2048	0.27481	1.30892
ay 1	+9.81441	+9.8696	-1.15154	-1.12796	16	+9.89926	+0.2091	-0.19624	-1.30959
2	9.81675	9.8624	1.14504	1.13627	17	9.90027	0.2167	0.10011	1.31014
3	9.81852	9.8523	1.13832	1.14431	18	9.90148	0.2266	9.97634	1.31057
4	9.81971	9.8457	1.13138	1.15207	19	9.90300	0.2375	9.80244	1.31087
5	9.82045	9.8487	1.12419	1.15957	h 20	9.90491	0.2483	9.50780	1.31105
h 6	+9.82101	+9.8646	-1.11676	-1.16682	(18.0) 21	+9.90717	+0.2576	-7.97040	-1.31112
L.O) 7	9.82173	9.8927	1.10908	1.17383	22	9.90978	0.2641	+9.48176	1.31106
8	9.82295	9.9278	1.10114	1.18060	23	9.91255	0.2668	9.78935	1.31089
9	9.82483	9.9638	1.09293	1.18714	24	9.91534	0.2651	9.96750	1.31059
10	9.82736	9.9949	1.08444	1.19346	25	9.91794	0.2594	0.09337	1.31017
11	+9.83036	+0.0183	-1.07565	-1.19956	26	+9.92012	+0.2511	+0.19074	-1.30963
12	9.83359	0.0323	1.06657	1.20546	27	9.92180	0.2421	0.27013	1.30897
13	9.83667	0.0375	1.05716	1.21115	28	9.92303	0.2350	0.33712	1.30819
14	9.83941	0.0362	1.04743	1.21664	29	9.92392	0.2321	0.39504	1.30729
15	9.84160	0.0313	1.03736	1.22194	30	9.92472	0.2348	0.44603	1.30626
16	+9.84325	+0.0262	-1.02692	-1.22706	July 1	+9.92570	+0.2425	+0.49156	-1.30511
17	+9.84443	+0.0238	-1.01611	-1.23199	2	+9.92710	+0.2536	+0.53265	-1.30384

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log
July 1	+9.92570	+0.2425	+0.49156	-1.30511	Aug. 16	+9.99205	+0.2066	+1.17879	-1.0
2	9.92710	0.2536	0.53265	1.30384	17	9.99386	0.2034	1.18410	1.0
3	9.92900	0.2650	0.57008	1.30244	18	9.99565	0.1956	1.18921	1.0
4	9.93138	0.2742	0.60443	1.30092	19	9.99724	0.1836	1.19415	1.0
5	9.93408	0.2793	0.63616	1.29927	20	9.99846	0.1692	1.19892	1.0
h					h				
(19.0) 6	+9.93686	+0.2795	+0.66561	-1.29750	(23.0) 21	+9.99929	+0.1548	+1.20351	-1.0
7	9.93946	0.2750	0.69307	1.29560	22	9.99978	0.1438	1.20794	1.0
8	9.94170	0.2670	0.71880	1.29356	23	0.00002	0.1387	1.21220	1.0
9	9.94352	0.2573	0.74297	1.29140	24	0.00027	0.1406	1.21630	0.9
10	9.94490	0.2479	0.76575	1.28910	25	0.00070	0.1488	1.22024	0.9
11	+9.94593	+0.2405	+0.78728	-1.28667	26	+0.00148	+0.1600	+1.22403	-0.9
12	9.94670	0.2363	0.80768	1.28411	27	0.00271	0.1713	1.22766	0.9
13	9.94738	0.2356	0.82705	1.28141	28	0.00427	0.1792	1.23114	0.9
14	9.94815	0.2381	0.84548	1.27857	29	0.00602	0.1817	1.23448	0.9
15	9.94906	0.2430	0.86304	1.27559	30	0.00778	0.1783	1.23767	0.9
16	+9.95022	+0.2496	+0.87980	-1.27248	31	+0.00932	+0.1695	+1.24071	-0.8
17	9.95166	0.2566	0.89583	1.26921	Sept. 1	0.01053	0.1572	1.24361	0.8
18	9.95343	0.2627	0.91117	1.26580	2	0.01135	0.1437	1.24637	0.8
19	9.95551	0.2666	0.92587	1.26224	3	0.01181	0.1317	1.24899	0.8
20	9.95780	0.2673	0.93998	1.25853	4	0.01202	0.1233	1.25147	0.8
h					h				
(20.0) 21	+9.96017	+0.2638	+0.95352	-1.25467	(23.0) 5	+0.01208	+0.1195	+1.25381	-0.7
22	9.96242	0.2562	0.96654	1.25065	6	0.01213	0.1208	1.25602	0.7
23	9.96434	0.2453	0.97907	1.24647	7	0.01228	0.1264	1.25810	0.7
24	9.96584	0.2329	0.99113	1.24212	8	0.01259	0.1349	1.26004	0.7
25	9.96693	0.2213	1.00275	1.23761	9	0.01311	0.1448	1.26185	0.6
26	+9.96764	+0.2134	+1.01396	-1.23293	10	+0.01391	+0.1549	+1.26353	-0.6
27	9.96818	0.2110	1.02476	1.22807	11	0.01497	0.1633	1.26508	0.6
28	9.96877	0.2144	1.03518	1.22304	12	0.01626	0.1688	1.26650	0.5
29	9.96966	0.2222	1.04525	1.21782	13	0.01768	0.1703	1.26779	0.5
30	9.97098	0.2317	1.05498	1.21242	14	0.01913	0.1667	1.26895	0.4
31	+9.97275	+0.2399	+1.06438	-1.20682	15	+0.02045	+0.1587	+1.26998	-0.4
Aug. 1	9.97483	0.2445	1.07346	1.20102	16	0.02149	0.1478	1.27088	0.3
2	9.97706	0.2441	1.08224	1.19502	17	0.02220	0.1364	1.27166	0.2
3	9.97922	0.2384	1.09073	1.18882	18	0.02258	0.1275	1.27231	0.2
4	9.98110	0.2283	1.09894	1.18240	19	0.02269	0.1242	1.27284	0.1
h					h				
(21.0) 5	+9.98258	+0.2157	+1.10688	-1.17575	(0.0) 20	+0.02276	+0.1282	+1.27324	-9.9
6	9.98366	0.2027	1.11456	1.16888	21	0.02295	0.1389	1.27351	9.7
7	9.98437	0.1914	1.12200	1.16177	22	0.02346	0.1541	1.27365	-9.3
8	9.98484	0.1834	1.12918	1.15441	23	0.02437	0.1701	1.27367	+9.0
9	9.98520	0.1794	1.13614	1.14681	24	0.02566	0.1835	1.27356	9.6
10	+9.98556	+0.1795	+1.14286	-1.13894	25	+0.02719	+0.1922	+1.27333	+9.9
11	9.98604	0.1829	1.14937	1.13080	26	0.02880	0.1950	1.27296	0.0
12	9.98672	0.1884	1.15566	1.12238	27	0.03025	0.1925	1.27247	0.1
13	9.98763	0.1950	1.16174	1.11366	28	0.03143	0.1862	1.27185	0.2
14	9.98884	0.2012	1.16762	1.10464	29	0.03224	0.1780	1.27110	0.3
15	+9.99034	+0.2054	+1.17330	-1.09530	30	+0.03270	+0.1709	+1.27022	+0.4
16	+9.99205	+0.2066	+1.17879	-1.08562	Oct. 1	+0.03289	+0.1669	+1.26922	+0.4

FOR WASHINGTON MEAN MIDNIGHT.

Star Day. Id. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
ct. 1	+0.03289	+0.1669	+1.26922	+0.46545	Nov. 16	+0.07079	+0.4187	+1.04233	+1.21938
2	0.03291	0.1671	1.26807	0.51430	17	0.07218	0.4304	1.03159	1.22482
3	0.03289	0.1718	1.26680	0.55813	18	0.07391	0.4399	1.02044	1.23006
4	0.03295	0.1805	1.26539	0.59784	19	0.07582	0.4464	1.00884	1.23511
h 5	0.03316	0.1920	1.26385	0.63412	h 20	0.07776	0.4494	0.99679	1.23997
1.0) 6	+0.03359	+0.2050	+1.26217	+0.66750	(4.0) 21	+0.07951	+0.4495	+0.98425	+1.24464
7	0.03427	0.2183	1.26036	0.69839	22	0.08099	0.4476	0.97119	1.24913
8	0.03519	0.2303	1.25841	0.72713	23	0.08212	0.4454	0.95758	1.25345
9	0.03636	0.2401	1.25631	0.75397	24	0.08294	0.4439	0.94338	1.25759
10	0.03769	0.2466	1.25408	0.77915	25	0.08355	0.4443	0.92856	1.26156
11	+0.03909	+0.2492	+1.25170	+0.80283	26	+0.08405	+0.4469	+0.91307	+1.26536
12	0.04042	0.2480	1.24918	0.82517	27	0.08457	0.4518	0.89685	1.26899
13	0.04155	0.2441	1.24651	0.84631	28	0.08517	0.4583	0.87986	1.27246
14	0.04238	0.2391	1.24370	0.86635	29	0.08596	0.4660	0.86203	1.27578
15	0.04288	0.2356	1.24073	0.88539	30	0.08696	0.4739	0.84328	1.27893
16	+0.04312	+0.2354	+1.23761	+0.90352	Dec. 1	+0.08818	+0.4816	+0.82354	+1.28192
17	0.04327	0.2406	1.23434	0.92080	2	0.08960	0.4883	0.80271	1.28476
18	0.04351	0.2512	1.23090	0.93731	3	0.09121	0.4934	0.78068	1.28745
19	0.04402	0.2657	1.22731	0.95309	4	0.09293	0.4964	0.75732	1.28998
h 20	0.04490	0.2816	1.22355	0.96820	h 5	0.09468	0.4972	0.73248	1.29237
2.0) 21	+0.04619	+0.2963	+1.21963	+0.98269	(5.0) 6	+0.09628	+0.4959	+0.70598	+1.29461
22	0.04778	0.3075	1.21553	0.99659	7	0.09766	0.4932	0.67760	1.29670
23	0.04951	0.3145	1.21126	1.00994	8	0.09878	0.4902	0.64710	1.29864
24	0.05115	0.3169	1.20681	1.02277	9	0.09960	0.4881	0.61413	1.30044
25	0.05259	0.3159	1.20218	1.03511	10	0.10023	0.4883	0.57829	1.30210
26	+0.05369	+0.3131	+1.19737	+1.04699	11	+0.10083	+0.4913	+0.53908	+1.30362
27	0.05442	0.3103	1.19236	1.05844	12	0.10154	0.4970	0.49582	1.30499
28	0.05488	0.3094	1.18716	1.06946	13	0.10252	0.5046	0.44760	1.30623
29	0.05515	0.3113	1.18176	1.08010	14	0.10387	0.5125	0.39318	1.30732
30	0.05535	0.3164	1.17616	1.09035	15	0.10555	0.5193	0.33080	1.30827
31	+0.05561	+0.3245	+1.17034	+1.10025	16	+0.10747	+0.5237	+0.25775	+1.30909
Nov. 1	0.05599	0.3346	1.16431	1.10980	17	0.10945	0.5253	0.16970	1.30977
2	0.05658	0.3460	1.15805	1.11902	18	0.11133	0.5242	0.05893	1.31031
3	0.05741	0.3576	1.15157	1.12792	19	0.11298	0.5211	9.90965	1.31071
h 4	0.05847	0.3685	1.14485	1.13652	h 20	0.11430	0.5171	9.68006	1.31098
2.0) 5	+0.05977	+0.3779	+1.13788	+1.14482	(6.0) 21	+0.11531	+0.5134	+9.16138	+1.31111
6	0.06125	0.3851	1.13066	1.15284	22	0.11607	0.5110	-9.27601	1.31110
7	0.06282	0.3894	1.12318	1.16059	23	0.11669	0.5104	9.71818	1.31095
8	0.06437	0.3910	1.11543	1.16807	24	0.11728	0.5118	9.93263	1.31067
9	0.06576	0.3901	1.10740	1.17530	25	0.11793	0.5148	0.07547	1.31024
10	+0.06689	+0.3880	+1.09908	+1.18228	26	+0.11871	+0.5189	-0.18269	+1.30968
11	0.06772	0.3861	1.09045	1.18902	27	0.11965	0.5236	0.26850	1.30899
12	0.06830	0.3862	1.08152	1.19554	28	0.12079	0.5283	0.34002	1.30815
13	0.06871	0.3896	1.07225	1.20182	29	0.12214	0.5322	0.40129	1.30717
14	0.06915	0.3966	1.06264	1.20788	30	0.12364	0.5350	0.45486	1.30606
15	+0.06980	+0.4069	+1.05267	+1.21373	31	+0.12527	+0.5360	-0.50242	+1.30480
16	+0.07079	+0.4187	+1.04233	+1.21938	32	+0.12691	+0.5351	-0.54517	+1.30340

$E = +0''.04 = +0''.003$

FOR

MEAN MIDNIGHT.

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FOR  **MEAN MIDNIGHT.**

FOR

MEAN MIDNIGHT.

214 BESSELIAN AND INDEPENDENT STAR-NUMBERS, 1918.

FOR WASHINGTON SIDEREAL TWELVE HOURS.

Mean Solar Date.		Log A ₁ .	Log B ₁ .	Log C.	Log D.	f	G ₁	H	Log g ₁ .	Log h.	Log i.
						s	° ' "	° ' "			
Jan.	0.72	+9.5459	+9.4442	-0.5229	+1.3042	+1.083	2 16	350 36	0.8481	1.3100	-0.1601
	10.69	9.5879	9.4227	0.8157	1.2830	1.192	1 57	341 10	0.8901	1.3069	0.4530
	20.67	9.6240	9.2956	0.9798	1.2462	1.296	1 20	331 34	0.9261	1.3020	0.6170
	30.64	9.6547	+8.9872	1.0878	1.1910	1.390	0 37	321 45	0.9567	1.2960	0.7251
Feb.	9.61	9.6804	-8.1584	1.1628	1.1120	1.475	359 55	311 39	0.9824	1.2894	0.8001
	19.59	+9.7020	-9.0488	-1.2149	+0.9986	+1.550	359 22	301 17	1.0040	1.2832	-0.8522
Mar.	1.56	9.7203	9.2398	1.2490	0.8263	1.616	359 3	290 42	1.0224	1.2780	0.8863
	11.53	9.7363	9.2608	1.2681	+0.5122	1.677	359 3	279 57	1.0384	1.2747	0.9054
	21.50	9.7510	9.1069	1.2736	-9.4446	1.734	359 21	269 9	1.0530	1.2737	0.9109
	31.48	9.7652	-7.8692	1.2661	0.5778	1.792	359 58	258 25	1.0672	1.2751	0.9034
Apr.	10.45	+9.7796	+9.2370	-1.2454	-0.8546	+1.852	0 49	247 52	1.0816	1.2786	-0.8827
	20.42	9.7949	9.6024	1.2103	1.0129	1.918	1 50	237 36	1.0971	1.2838	0.8476
	30.39	9.8113	9.8187	1.1584	1.1185	1.992	2 54	227 38	1.1139	1.2899	0.7957
May	10.37	9.8288	9.9670	1.0856	1.1926	2.074	3 56	218 0	1.1318	1.2962	0.7229
	20.34	9.8473	0.0736	0.9832	1.2450	2.165	4 48	208 41	1.1508	1.3019	0.6204
June	30.31	+9.8665	+0.1502	-0.8328	-1.2806	+2.262	5 29	199 38	1.1705	1.3066	-0.4700
	9.28	9.8858	0.2034	0.5805	1.3020	2.365	5 55	190 45	1.1901	1.3097	0.2178
	19.26	9.9049	0.2372	-9.8515	1.3108	2.471	6 7	181 59	1.2094	1.3111	-9.4888
	29.23	9.9233	0.2547	+0.3802	1.3076	2.578	6 6	173 16	1.2278	1.3106	+0.0174
July	9.20	9.9405	0.2579	0.7359	1.2921	2.682	5 55	164 28	1.2448	1.3082	0.3732
	19.18	+9.9564	+0.2491	+0.9212	-1.2634	+2.782	5 35	155 32	1.2605	1.3042	+0.5584
	29.15	9.9708	0.2306	1.0418	1.2197	2.876	5 11	146 25	1.2746	1.2990	0.6790
	8.12	9.9835	0.2060	1.1265	1.1573	2.961	4 46	137 2	1.2870	1.2929	0.7638
Aug.	18.09	9.9946	0.1796	1.1872	1.0695	3.038	4 22	127 20	1.2979	1.2867	0.8244
	28.07	0.0044	0.1571	1.2297	0.9430	3.107	4 3	117 20	1.3075	1.2811	0.8670
Sept.	7.04	+0.0130	+0.1450	+1.2572	-0.7436	+3.169	3 52	107 2	1.3160	1.2766	+0.8945
	17.01	0.0208	0.1488	1.2713	-0.3300	3.226	3 50	96 32	1.3238	1.2741	0.9086
	26.98	0.0282	0.1709	1.2728	+0.1282	3.281	3 58	85 54	1.3312	1.2739	0.9100
Oct.	6.96	0.0356	0.2093	1.2614	0.6819	3.338	4 15	75 15	1.3388	1.2759	0.8987
	16.93	0.0434	0.2590	1.2362	0.9111	3.398	4 41	64 41	1.3469	1.2801	0.8735
Nov.	26.90	+0.0519	+0.3135	+1.1954	+1.0517	+3.465	5 12	54 19	1.3557	1.2857	+0.8327
	5.88	0.0613	0.3672	1.1352	1.1479	3.541	5 46	44 10	1.3655	1.2921	0.7725
	15.85	0.0716	0.4159	1.0491	1.2157	3.626	6 17	34 16	1.3762	1.2985	0.6864
	25.82	0.0828	0.4570	0.9237	1.2628	3.721	6 44	24 36	1.3878	1.3041	0.5610
Dec.	5.79	0.0947	0.4889	0.7249	1.2930	3.823	7 3	15 8	1.4000	1.3083	0.3622
	15.77	+0.1068	+0.5109	+0.3125	+1.3085	+3.931	7 12	5 46	1.4122	1.3107	+9.9498
	25.74	0.1188	0.5230	-0.1035	1.3101	4.042	7 13	356 26	1.4243	1.3110	-9.7408
	35.71	+0.1304	+0.5260	-0.6586	+1.2979	+4.151	7 4	347 5	1.4357	1.3091	-0.2958

E=+0.003

The above numbers give the same reductions from mean to apparent place as are employed in computing the apparent places of the fixed stars, given on pages 316 to 513, from the mean places, given on pages 217 to 230. In order to render exact interpolation possible through intervals of ten days, all short period terms have been omitted.

**TERMS OF SHORT
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**IN THE NUTATION, 1918. 215
MEAN MIDNIGHT.**

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216 TERMS OF SHORT PERIOD IN THE NUTATION, 1918.

FOR W

MEAN MIDNIGHT.

MEAN PLACES OF TEN-DAY STARS, 1918. 217

FOR JANUARY 0^d.459, WASHINGTON MEAN TIME.

*
dup., 5^m.5, 0^m.2, 0^m.3
lop., var. irreg., 2^m.2, 2^m.8
lop., comp. 7^m.6, 4^m s. pc.

β Phoenix, dup., 4^m.1, 4^m.1, 1^m
ζ Piscium, star 0^m.5, 24^m n. l.

α Tucanae, comp. 7^m, 6^m n.
ε Sculptoris, comp. 6^m, 5^m n. l.

218 MEAN PLACES OF TEN-DAY STARS, 1918.

FOR JANUARY 0^d.459,

MEAN TIME.

• Ceti, var., 3314, 1^m.7-2^m.6, star 9^m 1.9
 ♈ Cassio., triple, 7^m, 8^m, 2^m, 8^m
 ♊ Ceti, comp. 6^m.2, 2^m.7 pr.

♊ Persei, star 8^m.5, 28^m n. pr.
 ♈ Arietis, dup., 8^m.2, 8^m.6, 1^m.2
 ♉ Eridani, comp. 4^m.4, 1. 8^m

♊ Persei, var. irreg., 2^m.4-4^m.3
 ♈ Persei, var., 2^m.57, 3^m.1-3^m.2
 ♉ Eridani, comp. 7^m, 1^m.4 n. }

MEAN PLACES OF TEN-DAY STARS, 1918. 219

FOR JANUARY 0^d.450, WASHINGTON MEAN TIME.

♄ Horologii, remarkable purplish red
star.
♌ Eridani, comp. 9^m, s. 7"

♋ Tauri, quad., comps. 6^m.3, 7^m.6,
8^m.2, 117'', 131'', 140''
♎ H. Camelopard., comp. 8^m, 1''.9 n. f.
♈ Persei, comp. 8^m, 8''.6 n. f.

♋ Tauri, var., 3^d.95, 3^m.3-4^m.2
♋ Tauri, star 6^m.5 f. 38'', 253'' s.
♎ Persei, star 6^m, 115'' s. pr.
♈ Aurigæ, var. irreg., 3^m.0-4^m.3

220 MEAN PLACES OF TEN-DAY STARS, 1918.

FOR JANUARY 0^h.459, WASHINGTON MEAN TIME.

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 η Au
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 λ Au
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 φ¹ Ori
 ι Ori
 ε Ori
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 ζ Car
 μ Gei
 φ¹ Au
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* Orionis, comp. 8^m.0, 9^s.5 s. p.
 * Orionis, star 6^m.9, 52^s.6 n.
 † Orionis, comp. 7^m.3, 11^s.5 s. f.

ζ Orionis, comp. 4^m.2, 2^s.4 s. f.
 * Orionis, red star, var. irreg., 1^m.0-1^m.4
 * Aurigæ, comp. 7^m.5, 3^s.5 n. p.

1 Puppis, star 5^m.8, 130^s. f.
 γ Gem., var., 231^d.4, 3^m.2-4^m.2, comp. 8^m.8, 1^s.2 n. p.
 8 Monoc., star 6^m.5, 13^s.7 n. f.

MEAN PLACES OF TEN-DAY STARS, 1918. 221

FOR JANUARY 0^d.459,

MEAN TIME.

1., comp. 8^m.8, 2^m.9 s. pr.
 s. dup., 4^m.9, 6^m.2, 0^m.7
 4a., comp. 9^m, 7^m.6 s. f.
 var., 10^d.15, 3^m.7-4^m.3

γ² Volantis, comp. 5^m.8, 12^m.9 n. pr.
 δ Gem., comp. 6^m, 7^m.0 s. pr.
 e Argus, star 8^m, 22^m.4 n. f.
 z Gem., comp. 8^m.5, 6^m.6 s. pr.

γ
 δ

8^m.3, 1^m.
 f.

ious given for Sirius and Procyon are those of the centers of their orbits. Corrections given on page x remain
 died to reduce to the positions of the stars.

222 MEAN PLACES OF TEN-DAY STARS, 1918.

FOR JANUARY 0^d.459, WASHINGTON MEAN TIME.

1 Canceri, star 6^m.6, 30^{''}.6 n. pr.
 2 Hydrie, triple; binary 3^m.5, 6^m.8,
 0^{''}.2, with comp. 7^m.8, 3^{''}.3
 3 Argus, comp. 5^m, 2^{''} a.

4^a Canceri, dup., 5^m.9, 6^m.4, 1^{''}.4
 5^a Carinae, comp. 7^m.2, 5^m.6
 6^a Urs. Maj., binary, 4^m.0, 9^m, 1^{''}.3

7 Argus, dup., 3^m.8, 6^m.0, 0^{''}.
 8 Argus, comp. 6^m.0, 4^{''}.9 a. 1
 9 Leonis, comp. 3^m.8, 3^{''}.7 a.

MEAN PLACES OF TEN-DAY STARS, 1918. 223

FOR JANUARY 0^d.459, WASHINGTON MEAN TIME.

4 Argus, var. irreg., 1^m.6-6^m.8
 4 Argus, comp. 7^m, 2^m.9 n. l.

83 Cham., star 8^m.5 pr. 22^m, 256^m n.
 54 Leonis, comp. 6^m.3, 6^m.4 s. l.

4 Leonis, comp. 6^m.8, 2^m.6 n. l.
 2 Can. Ven., star 8^m, 11^m.6 s. pr.

224 MEAN PLACES OF TEN-DAY STARS, 1918.

FOR JANUARY 0^d.459,

MEAN TIME.

δ Corvi, star 8^m, 21'' .4 s. pr.
 γ Crucis, star 6^m.6, 85'' n. f.
 24 Comæ, star 6^m.7, 20'' .6 pr.
 γ Cent., dup., 3^m.1, 3^m.1, 1'' .7

γ Virginis, binary, 3^m.7, 3^m.7, 6'' .2,
 P=328^d
 α Can. Ven., star 5^m, 19'' .8 s. pr.
 θ Virginis, comp. 9^m, 7'' .1 n. pr.

ζ Urs. Maj., star Alcor 4^m.0,
 232'' n.
 θ Apodis, var. irreg., 5^m.5-6^m

MEAN PLACES OF TEN-DAY STARS, 1918. 225

FOR JANUARY 0^d.459, WASHINGTON MEAN TIME.

ϵ Virginis, comp. 9^m , $4''$.5 s. l. | δ Libræ, var., 2^d .33, 4^m .8- 5^m .3 | γ Lupi, binary, 3^m .7, 3^m .9, $0''$.4
 ϵ Bootis, comp. 5^m .1, $2''$.8 n. pr. | μ Bootis, star 5^m .7, $108''$ s. | ζ Cor. Bor., comp. 5^m .0, $6''$.2 n. pr.
 α Centauri, dup., 0^m .3, 1^m .7; companion s. pr. The position given is that of the center of gravity of the system.
 Corrections given on page x remain to be applied to reduce to the position of α^3 Centauri.

226 MEAN PLACES OF TEN-DAY STARS, 1918.

FOR JANUARY 0^d.459, WASHINGTON MEAN TIME.

β Scorpil, comp. 6^m.1, 13^m.3 n. f.
 α Herculis, star 6^m.5, 29^m.7 n. f.
 γ Cor. Bor, comp. 6^m.7, 4^m.6 s. pr.
 δ Scorpil, star 8^m, 21^m pr.
 ε Draconis, comp. 8^m, 5^m.4 s. f.

α Scorpil, comp. 7^m, 3^m.2 pr.
 λ φiluchī, comp. 6^m, 1^m.2 n. f.
 ζ Herculis, binary, 3^m.0, 6^m.0, 1^m
 η Oph., binary, 3^m.2, 3^m.7, 0^m.5

α Herculis, var. irreg., 3^m.1-3^m.3,
 dup., comp. 6^m, 4^m.6 s. f.
 δ Herculis, binary, comp. 8^m, 12^m
 s. pr.

MEAN PLACES OF TEN-DAY STARS, 1918. 227

FOR JANUARY 0^d.459, WASHINGTON MEAN TIME.

is, star 6^m.1, 30^m.4 n. f.
hl, comp. 6^m, 8^m.1 s. f.

β Lyrae, var., 12^d.9, 3^m.4-4^m.1, star
7^m, 46^m.7 s. f.
• Draco, star 7^m.6, 32^m.1 n. pr.

• Serpens, star 5^m.4, 22^m.2 s. f.
R Lyrae, var., 46^d.4, 4^m.0-4^m.7
ζ Sag., binary, 3^m.4, 3^m.8, 0^m.8

228 MEAN PLACES OF TEN-DAY STARS, 1918.

FOR JANUARY 0^d.450, WASHINGTON MEAN TIME.

β Cygni, star 5^m.4, 34^m.7 n. l.
 δ Cygni, comp. 8^m, 1^m.5 n. pr.
 η Aquilæ, var., 7^d.18, 3^m.7-4^m.4
 ϵ Draconis, comp. 7^m.5, 3^m.1 n.

ϵ Cygni, star 5^m.0 pr. 19^m, 270^m n.,
 star 7^m.8 f. 1^m, 96^m s.
 α Cephei, comp. 8^m, 7^m.5 s. f.
 α^2 Capricorn., α^1 Capricorn. 4^m.5 pr. 24^m,
 13^m.7 n.

β Capricorn., star 5^m.2 pr. 14^m, 10^m s.
 π Capricorn., comp. 8^m, 3^m.4 s. f.
 ρ Capricorn., comp. 7^m.6, 2^m.8 s.
 δ Delphini, binary, 4^m.1, 5^m.4, 0^m.5
 γ Delphini, comp. 5^m.5, 11^m.2 pr.

MEAN PLACES OF TEN-DAY STARS, 1918. 229

FOR JANUARY 0^d.459, WASHINGTON MEAN TIME.

Cygni, comp. 7^m, 0^s.8

| γ Cygni, star 6^m.7 l. 10^s, 430^s s.

| β Cephei, star 8^m, 13^s.3 s. pr.

230 MEAN PLACES OF TEN-DAY STARS, 1918.

FOR JANUARY 0^h.450, WASHINGTON MEAN TIME.

β Pegasi, var. irreg., 2^m.2-2^m.7
 π Cephei, comp. 7^m, 0^s.9 f.

| ψ Aquarii, star 8^m.5, 49^s.4 n. pr.
 * Cephei, comp. 8^m, 2^s.9 s. pr.

| 72 Pegasi, binary, 0^m.0, 0^m.0

AN PLACES OF CIRCUMPOLAR STARS, 1918. 231

FOR JANUARY 0^d.459, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- tion.	Annual P. M.	Declination.	Annual Vari- tion.	Annual P. M.
			h m s	s	s	° ' "	"	"
ephei . . .	4.5	K0	0 57 16.959	+ 7.6664	+.0781	+85 49 4.72	+19.418	-0.004
e Min. (<i>Polaris</i>) . †	2.1	F8	1 30 42.307	+29.2762	+.1479	+88 52 2.06	+18.496	+0.002
Octantis . . .	5.6	K0	1 41 58.587	- 3.7460	+.0086	-85 11 3.34	+18.121	+0.028
ombridge 750 . . .	6.7	F8	4 10 20.187	+17.6351	+.0129	+85 20 19.62	+ 9.272	+0.042
ombridge 944 . . .	6.4	K0	5 35 31.554	+18.7745	+.0130	+85 9 32.39	+ 2.132	-0.004
fensæ . . .	6.2	A0	5 46 3.075	-11.6801	-.0122	-84 49 45.59	+ 1.306	+0.087
æ . . .	5.6	A2	6 46 53.600	- 4.9463	-.0036	-80 43 42.15	- 3.991	+0.082
ephei . . .	5.3	Ma	7 2 33.206	+29.1435	-.0578	+87 10 49.32	- 5.438	-0.035
amelopardalis . . .	5.1	Mb	7 13 55.106	+12.8092	+.0132	+82 34 23.73	- 6.400	-0.047
Octantis . . .	6.4	F5	7 16 0.004	-20.3004	-.0146	-86 54 13.24	- 6.521	+0.006
ombridge 1119 . . .	7.0	A0	8 16 48.125	+59.5826	-.0400	+88 52 49.08	-11.250	+0.017
antis . . .	5.4	A3	9 8 49.775	- 8.1718	-.1148	-85 20 12.12	-14.666	+0.043
Draconis . . .	4.6	K0	9 25 30.501	+ 8.7780	-.0059	+81 41 25.82	-15.688	-0.027
naeleontis . . .	5.2	B3	9 36 20.688	- 1.6605	-.0121	-80 34 23.04	-16.216	+0.019
amelopardalis . . .	5.3	F5	10 21 12.394	+ 7.5589	-.0462	+82 58 35.87	-18.203	+0.009
antis . . .	6.3	A0	10 59 54.915	- 0.3668	-.0674	-84 9 9.97	-19.365	-0.005
lley 1672 . . .	6.3	F0	12 14 28.804	+ 0.3826	-.0715	+88 9 16.14	-19.947	+0.058
antis . . .	5.4	K0	12 46 13.131	+ 5.9830	+.0366	-84 40 41.95	-19.615	+0.024
amelop. seq. . . †	5.3	A2	12 48 30.862	+ 0.4449	-.0184	+83 51 30.88	-19.582	+0.016
antis . . .	5.6	A2	13 27 23.749	+ 9.1332	-.0764	-85 22 0.86	-18.629	-0.024
antis . . .	4.1	K2	14 13 37.066	+ 9.2787	-.0511	-83 17 37.78	-16.748	-0.014
ombridge 2283 . . .	7.2	K0	15 3 21.809	-19.3321	-.0067	+87 32 56.60	-13.934	+0.031
antis . . .	5.7	A2	15 24 9.966	+13.3787	+.0842	-84 11 42.92	-12.523	+0.080
e Minoris . . .	4.4	G5	16 54 19.238	- 6.2481	+.0057	+82 10 27.09	- 5.667	-0.001
apodis . . .	5.9	Mb	17 16 6.064	+11.1691	+.0086	-80 47 10.43	- 3.855	-0.089
e Minoris . . .	4.4	A0	17 58 41.809	-19.4975	+.0174	+86 36 51.12	- 0.066	+0.048
antis . . .	5.2	K0	18 6 47.620	+35.7248	-.0962	-87 39 51.38	+ 0.467	-0.127
e Minoris . . .	6.6	Mb	19 1 27.463	-72.2731	-.1106	+89 1 7.53	+ 5.317	+0.006
antis . . .	5.5	F0	19 29 16.746	+94.2768	+.1082	-89 13 21.02	+ 7.613	-0.001
conis . . .	5.7	A0	20 48 36.323	- 4.1738	+.0131	+82 13 43.34	+13.477	+0.025
antis . . . †	5.4	G0p	21 38 29.050	+ 9.5028	+.0388	-83 5 50.66	+16.331	-0.012
antis . . .	5.7	K0	22 16 20.949	+12.2784	-.0400	-86 23 9.03	+18.104	+0.074
antis . . .	4.3	F0	22 37 45.323	+ 6.3043	-.0302	-81 48 43.57	+18.770	+0.002
ephei . . .	5.6	F0	23 27 43.851	- 0.2768	+.0640	+86 51 18.76	+19.867	+0.020
antis . . .	5.1	G5	23 47 20.032	+ 3.6069	-.0247	-82 28 28.42	+20.003	-0.012

fm., star 9=, 18' s. pr. | 32 H. Camelop., star 5=, 19'.8 s. pr. | λ Octantis, binary, 5=5, 8=0, 3''.2 n. f.

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 0 57	° ' +85 49	Jan.	h m 1 30	° ' +88 52	Jan.	h m 1 41	° ' -85 11	Jan.	h m 4 10	° ' +85 20	Jan.	h m 5 35	° ' +85 9
	s	"		s	"		s	"		s	"		s	"
0.3	21.62	31.72	0.3	69.86	28.31	0.3	61.69	16.67	0.4	40.01	34.65	0.5	53.79	38.13
1.3	21.30	31.78	1.3	68.72	28.42	1.3	61.45	16.71	1.4	39.87	34.93	1.5	53.75	38.46
2.3	20.99	31.82	2.3	67.62	28.53	2.3	61.20	16.74	2.4	39.72	35.22	2.4	53.71	38.79
3.3	20.70	31.85	3.3	66.54	28.62	3.3	60.93	16.78	3.4	39.57	35.47	3.4	53.65	39.09
4.3	20.42	31.86	4.3	65.50	28.70	4.3	60.65	16.85	4.4	39.42	35.71	4.4	53.60	39.37
5.3	20.14	31.87	5.3	64.51	28.78	5.3	60.37	16.89	5.4	39.28	35.95	5.4	53.54	39.65
6.2	19.89	31.89	6.3	63.56	28.85	6.3	60.07	16.91	6.4	39.15	36.17	6.4	53.49	39.93
7.2	19.64	31.92	7.3	62.62	28.93	7.3	59.77	16.92	7.4	39.03	36.40	7.4	53.45	40.20
8.2	19.40	31.95	8.3	61.71	29.01	8.3	59.47	16.92	8.4	38.92	36.64	8.4	53.42	40.46
9.2	19.15	32.00	9.3	60.79	29.10	9.3	59.17	16.88	9.4	38.81	36.88	9.4	53.40	40.74
10.2	18.89	32.06	10.3	59.82	29.20	10.3	58.88	16.82	10.4	38.70	37.14	10.4	53.37	41.05
11.2	18.61	32.12	11.3	58.81	29.31	11.3	58.60	16.74	11.4	38.58	37.41	11.4	53.35	41.36
12.2	18.32	32.17	12.3	57.71	29.42	12.3	58.33	16.66	12.4	38.45	37.68	12.4	53.32	41.69
13.2	18.00	32.19	13.2	56.55	29.52	13.3	58.07	16.57	13.4	38.28	37.97	13.4	53.26	42.02
14.2	17.67	32.20	14.2	55.34	29.57	14.3	57.83	16.50	14.4	38.11	38.25	14.4	53.18	42.36
15.2	17.36	32.18	15.2	54.12	29.61	15.3	57.59	16.44	15.4	37.91	38.49	15.4	53.08	42.67
16.2	17.04	32.14	16.2	52.94	29.62	16.2	57.33	16.40	16.4	37.70	38.69	16.4	52.96	42.96
17.2	16.75	32.08	17.2	51.84	29.62	17.2	57.06	16.36	17.4	37.50	38.88	17.4	52.83	43.22
18.2	16.47	32.02	18.2	50.78	29.60	18.2	56.78	16.33	18.3	37.30	39.05	18.4	52.70	43.47
19.2	16.22	31.95	19.2	49.80	29.58	19.2	56.48	16.29	19.3	37.11	39.21	19.4	52.60	43.71
20.2	15.98	31.88	20.2	48.88	29.56	20.2	56.17	16.22	20.3	36.95	39.37	20.4	52.50	43.94
21.2	15.75	31.84	21.2	47.97	29.56	21.2	55.85	16.13	21.3	36.79	39.54	21.4	52.41	44.18
22.2	15.52	31.81	22.2	47.03	29.57	22.2	55.56	16.00	22.3	36.64	39.74	22.4	52.33	44.43
23.2	15.25	31.79	23.2	46.04	29.59	23.2	55.28	15.86	23.3	36.48	39.94	23.4	52.25	44.69
24.2	14.98	31.75	24.2	44.99	29.61	24.2	55.01	15.71	24.3	36.30	40.15	24.4	52.16	44.97
25.2	14.70	31.71	25.2	43.88	29.62	25.2	54.76	15.56	25.3	36.11	40.36	25.4	52.05	45.26
26.2	14.39	31.66	26.2	42.70	29.61	26.2	54.51	15.42	26.3	35.90	40.57	26.4	51.92	45.55
27.2	14.08	31.57	27.2	41.52	29.58	27.2	54.27	15.28	27.3	35.67	40.77	27.4	51.77	45.84
28.2	13.77	31.44	28.2	40.33	29.53	28.2	54.03	15.13	28.3	35.43	40.95	28.4	51.60	46.10
29.2	13.48	31.31	29.2	39.16	29.45	29.2	53.78	15.01	29.3	35.18	41.10	29.4	51.43	46.35
30.2	13.19	31.17	30.2	38.03	29.37	30.2	53.53	14.89	30.3	34.92	41.24	30.4	51.24	46.58
31.2	12.92	31.02	31.2	36.95	29.27	31.2	53.26	14.78	31.3	34.67	41.36	31.4	51.06	46.80
13.74 +13.70			50.93 +50.92			11.92 -11.88			12.32 +12.28			11.86 +11.82		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .554		
+85° 49' 4''.72			+88° 52' 2''.06			-85° 11' 3''.34			+85° 20' 19''.62			+85° 9' 32''.39		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			5 Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Jan.	5 46	-84 49	Jan.	6 46	-80 43	Jan.	7 3	+87 10	Jan.	7 14	+82 34	Jan.	7 16	-86 54
	s	"		s	"		s	"		s	"		s	"
0.5	13.67	49.98	0.5	60.32	43.16	0.5	10.97	44.78	0.5	10.00	17.79	0.5	17.74	12.37
1.5	13.59	50.29	1.5	60.30	43.50	1.5	11.07	45.12	1.5	10.06	18.12	1.5	17.74	12.69
2.5	13.50	50.60	2.5	60.29	43.85	2.5	11.16	45.45	2.5	10.10	18.43	2.5	17.74	13.03
3.5	13.40	50.93	3.5	60.28	44.22	3.5	11.21	45.77	3.5	10.14	18.73	3.5	17.75	13.39
4.5	13.30	51.27	4.5	60.27	44.57	4.5	11.26	46.08	4.5	10.17	19.02	4.5	17.75	13.77
5.4	13.20	51.62	5.5	60.24	44.97	5.5	11.32	46.36	5.5	10.21	19.30	5.5	17.73	14.14
6.4	13.07	51.97	6.5	60.21	45.37	6.5	11.40	46.65	6.5	10.24	19.56	6.5	17.70	14.56
7.4	12.94	52.31	7.5	60.19	45.77	7.5	11.48	46.92	7.5	10.28	19.81	7.5	17.66	14.97
8.4	12.80	52.66	8.5	60.16	46.16	8.5	11.56	47.19	8.5	10.32	20.08	8.5	17.58	15.37
9.4	12.63	52.99	9.5	60.11	46.53	9.5	11.66	47.47	9.5	10.38	20.33	9.5	17.49	15.75
10.4	12.46	53.31	10.5	60.06	46.93	10.5	11.77	47.77	10.5	10.44	20.61	10.5	17.35	16.13
11.4	12.29	53.60	11.5	60.00	47.27	11.5	11.89	48.08	11.5	10.51	20.91	11.5	17.21	16.50
12.4	12.12	53.86	12.5	59.95	47.61	12.5	11.99	48.41	12.5	10.57	21.23	12.5	17.06	16.83
13.4	11.96	54.13	13.5	59.89	47.93	13.5	12.08	48.75	13.5	10.62	21.56	13.5	16.92	17.14
14.4	11.81	54.39	14.5	59.84	48.25	14.5	12.12	49.11	14.5	10.65	21.91	14.5	16.78	17.46
15.4	11.66	54.64	15.5	59.79	48.56	15.5	12.12	49.47	15.5	10.65	22.24	15.5	16.65	17.78
16.4	11.51	54.92	16.5	59.73	48.89	16.5	12.07	49.80	16.5	10.65	22.57	16.5	16.55	18.11
17.4	11.35	55.21	17.5	59.68	49.23	17.5	12.01	50.12	17.5	10.64	22.88	17.5	16.45	18.46
18.4	11.19	55.53	18.5	59.63	49.59	18.5	11.94	50.41	18.5	10.62	23.16	18.5	16.33	18.83
19.4	11.02	55.85	19.5	59.58	49.97	19.5	11.88	50.69	19.5	10.60	23.43	19.5	16.21	19.23
20.4	10.84	56.16	20.4	59.53	50.36	20.5	11.83	50.96	20.5	10.60	23.69	20.5	16.08	19.63
21.4	10.62	56.47	21.4	59.45	50.73	21.5	11.81	51.23	21.5	10.60	23.94	21.5	15.90	20.03
22.4	10.41	56.76	22.4	59.37	51.11	22.5	11.80	51.50	22.5	10.62	24.21	22.5	15.69	20.41
23.4	10.20	57.03	23.4	59.29	51.44	23.5	11.79	51.81	23.5	10.63	24.49	23.5	15.47	20.77
24.4	9.98	57.27	24.4	59.20	51.76	24.4	11.79	52.12	24.5	10.65	24.80	24.5	15.24	21.10
25.4	9.78	57.50	25.4	59.11	52.06	25.4	11.76	52.45	25.5	10.66	25.12	25.5	15.00	21.42
26.4	9.58	57.71	26.4	59.03	52.34	26.4	11.69	52.78	26.5	10.65	25.45	26.5	14.77	21.72
27.4	9.37	57.92	27.4	58.95	52.62	27.4	11.60	53.12	27.4	10.62	25.77	27.5	14.55	22.02
28.4	9.17	58.13	28.4	58.87	52.90	28.4	11.47	53.45	28.4	10.58	26.10	28.4	14.35	22.32
29.4	8.98	58.35	29.4	58.78	53.19	29.4	11.31	53.78	29.4	10.53	26.42	29.4	14.15	22.62
30.4	8.78	58.58	30.4	58.71	53.50	30.4	11.14	54.10	30.4	10.48	26.71	30.4	13.96	22.94
31.4	8.58	58.82	31.4	58.63	53.81	31.4	10.95	54.39	31.4	10.43	27.00	31.4	13.76	23.26
11.10 -11.06			6.21 -6.13			20.33 +20.30			7.74 +7.67			18.52 -18.49		
5 ^h 46 ^m 3 ^s .075			6 ^h 46 ^m 53 ^s .600			7 ^h 2 ^m 33 ^s .206			7 ^h 13 ^m 55 ^s .106			7 ^h 16 ^m 0 ^s .004		
-84° 49' 45".59			-80° 43' 42".15			+87° 10' 49".32			+82° 34' 23".73			-86° 54' 13".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Jan.	8 18	+88 52	Jan.	9 9	-85 20	Jan.	9 25	+81 41	Jan.	9 36	-80 34	Jan.	10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
0.6	11.73	36.17	0.6	0.28	5.10	0.6	40.52	6.33	0.6	26.08	14.99	0.7	21.21	12.33
1.6	12.35	36.47	1.6	0.40	5.40	1.6	40.65	6.55	1.6	26.16	15.28	1.7	21.39	12.48
2.6	12.92	36.77	2.6	0.52	5.70	2.6	40.76	6.77	2.6	26.25	15.58	2.6	21.56	12.64
3.6	13.41	37.06	3.6	0.66	6.02	3.6	40.87	7.00	3.6	26.33	15.89	3.6	21.71	12.81
4.6	13.88	37.34	4.6	0.80	6.34	4.6	40.98	7.21	4.6	26.42	16.21	4.6	21.84	12.95
5.6	14.34	37.62	5.6	0.93	6.70	5.6	41.08	7.41	5.6	26.51	16.55	5.6	21.99	13.09
6.6	14.79	37.87	6.6	1.07	7.07	6.6	41.18	7.61	6.6	26.60	16.90	6.6	22.13	13.23
7.5	15.24	38.11	7.6	1.21	7.44	7.6	41.29	7.80	7.6	26.69	17.26	7.6	22.28	13.37
8.5	15.74	38.35	8.6	1.31	7.83	8.6	41.39	7.96	8.6	26.77	17.64	8.6	22.43	13.49
9.5	16.29	38.61	9.6	1.40	8.23	9.6	41.52	8.14	9.6	26.84	18.04	9.6	22.60	13.61
10.5	16.89	38.87	10.6	1.48	8.62	10.6	41.64	8.32	10.6	26.90	18.42	10.6	22.76	13.73
11.5	17.50	39.15	11.6	1.54	9.00	11.6	41.77	8.52	11.6	26.95	18.81	11.6	22.94	13.87
12.5	18.09	39.47	12.6	1.59	9.38	12.6	41.91	8.74	12.6	27.00	19.18	12.6	23.12	14.03
13.5	18.63	39.78	13.6	1.64	9.75	13.6	42.03	8.97	13.6	27.05	19.53	13.6	23.30	14.20
14.5	19.11	40.12	14.6	1.68	10.07	14.6	42.14	9.23	14.6	27.09	19.87	14.6	23.46	14.40
15.5	19.48	40.46	15.6	1.73	10.40	15.6	42.24	9.51	15.6	27.14	20.20	15.6	23.61	14.63
16.5	19.75	40.79	16.6	1.80	10.74	16.6	42.32	9.79	16.6	27.19	20.53	16.6	23.75	14.87
17.5	19.95	41.11	17.6	1.88	11.10	17.6	42.39	10.07	17.6	27.24	20.88	17.6	23.86	15.10
18.5	20.09	41.41	18.6	1.96	11.46	18.6	42.46	10.32	18.6	27.30	21.25	18.6	23.96	15.32
19.5	20.26	41.68	19.6	2.04	11.86	19.6	42.52	10.56	19.6	27.37	21.63	19.6	24.07	15.52
20.5	20.44	41.93	20.5	2.10	12.27	20.6	42.59	10.78	20.6	27.42	22.05	20.6	24.18	15.71
21.5	20.67	42.20	21.5	2.16	12.70	21.6	42.67	10.98	21.6	27.47	22.47	21.6	24.30	15.88
22.5	20.95	42.47	22.5	2.19	13.12	22.6	42.75	11.20	22.6	27.52	22.89	22.6	24.43	16.06
23.5	21.25	42.78	23.5	2.20	13.53	23.6	42.85	11.43	23.6	27.56	23.31	23.6	24.57	16.24
24.5	21.55	43.09	24.5	2.19	13.91	24.6	42.94	11.69	24.6	27.59	23.71	24.6	24.71	16.46
25.5	21.83	43.42	25.5	2.18	14.29	25.5	43.03	11.95	25.6	27.60	24.09	25.6	24.85	16.69
26.5	22.04	43.75	26.5	2.17	14.65	26.5	43.12	12.23	26.6	27.61	24.47	26.6	24.98	16.95
27.5	22.19	44.10	27.5	2.16	15.01	27.5	43.18	12.56	27.5	27.63	24.83	27.6	25.11	17.21
28.5	22.26	44.46	28.5	2.15	15.37	28.5	43.24	12.88	28.5	27.65	25.18	28.6	25.21	17.48
29.5	22.24	44.79	29.5	2.15	15.73	29.5	43.29	13.19	29.5	27.66	25.53	29.6	25.31	17.77
30.5	22.18	45.13	30.5	2.15	16.09	30.5	43.34	13.50	30.5	27.69	25.89	30.6	25.40	18.06
31.5	22.06	45.47	31.5	2.16	16.46	31.5	43.37	13.82	31.5	27.72	26.26	31.6	25.48	18.35
51.07 +51.06			12.30 -12.26			6.91 +6.84			6.11 -6.02			8.17 +8.11		
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
+88° 52' 49".08			-85° 20' 12".12			+81° 41' 25".82			-80° 34' 23".04			+82° 58' 35".87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

7 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			1 Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 11 0	° ' -84 8	Jan.	h m 12 14	° ' +88 8	Jan.	h m 12 46	° ' -84 40	Jan.	h m 12 48	° ' +83 51	Jan.	h m 13 27	° ' -85 21
	s "	"		s "	"		s "	"		s "	"		s "	"
0.7	0.47	58.53	0.7	32.73	48.70	0.8	14.88	28.71	0.8	30.30	3.53	0.8	23.59	47.62
1.7	0.65	58.72	1.7	33.46	48.68	1.8	15.10	28.77	1.8	30.52	3.46	1.8	23.86	47.62
2.7	0.83	58.95	2.7	34.17	48.72	2.7	15.33	28.83	2.8	30.74	3.40	2.8	24.14	47.62
3.7	1.02	59.17	3.7	34.84	48.74	3.7	15.61	28.90	3.7	30.94	3.36	3.8	24.43	47.63
4.7	1.22	59.39	4.7	35.49	48.76	4.7	15.86	28.96	4.7	31.14	3.33	4.8	24.74	47.63
5.7	1.42	59.61	5.7	36.11	48.75	5.7	16.13	29.04	5.7	31.33	3.31	5.8	25.06	47.63
6.7	1.62	59.87	6.7	36.72	48.80	6.7	16.41	29.14	6.7	31.52	3.27	6.8	25.38	47.66
7.7	1.83	60.14	7.7	37.32	48.80	7.7	16.70	29.28	7.7	31.71	3.22	7.8	25.72	47.71
8.7	2.03	60.44	8.7	37.92	48.81	8.7	16.99	29.40	8.7	31.90	3.18	8.8	26.06	47.78
9.7	2.22	60.75	9.7	38.55	48.80	9.7	17.26	29.57	9.7	32.10	3.10	9.8	26.40	47.87
10.7	2.40	61.07	10.7	39.23	48.79	10.7	17.54	29.75	10.7	32.31	3.04	10.8	26.72	47.99
11.6	2.55	61.40	11.7	39.93	48.78	11.7	17.78	29.93	11.7	32.53	2.98	11.8	27.04	48.11
12.6	2.70	61.71	12.7	40.67	48.78	12.7	18.03	30.12	12.7	32.76	2.92	12.8	27.33	48.23
13.6	2.84	62.00	13.7	41.42	48.82	13.7	18.25	30.31	13.7	33.00	2.88	13.7	27.60	48.36
14.6	2.97	62.29	14.7	42.17	48.87	14.7	18.47	30.48	14.7	33.24	2.88	14.7	27.88	48.46
15.6	3.11	62.57	15.7	42.90	48.96	15.7	18.69	30.63	15.7	33.47	2.90	15.7	28.14	48.57
16.6	3.26	62.85	16.7	43.58	49.06	16.7	18.92	30.76	16.7	33.69	2.95	16.7	28.42	48.65
17.6	3.42	63.12	17.7	44.20	49.17	17.7	19.16	30.90	17.7	33.88	3.01	17.7	28.70	48.73
18.6	3.59	63.40	18.7	44.77	49.27	18.7	19.43	31.04	18.7	34.07	3.06	18.7	29.02	48.81
19.6	3.77	63.72	19.7	45.32	49.37	19.7	19.70	31.22	19.7	34.25	3.11	19.7	29.36	48.91
20.6	3.95	64.05	20.7	45.87	49.45	20.7	19.97	31.42	20.7	34.43	3.16	20.7	29.70	49.04
21.6	4.11	64.41	21.7	46.42	49.53	21.7	20.24	31.64	21.7	34.61	3.19	21.7	30.04	49.20
22.6	4.26	64.78	22.7	47.00	49.62	22.7	20.51	31.87	22.7	34.80	3.21	22.7	30.36	49.37
23.6	4.40	65.15	23.7	47.63	49.69	23.7	20.76	32.12	23.7	35.00	3.23	23.7	30.68	49.55
24.6	4.52	65.52	24.7	48.28	49.78	24.7	20.99	32.37	24.7	35.22	3.27	24.7	30.96	49.73
25.6	4.62	65.86	25.7	48.97	49.88	25.7	21.20	32.62	25.7	35.44	3.31	25.7	31.25	49.93
26.6	4.73	66.20	26.7	49.65	50.01	26.7	21.40	32.86	26.7	35.67	3.39	26.7	31.51	50.12
27.6	4.82	66.53	27.7	50.32	50.16	27.7	21.60	33.09	27.7	35.89	3.47	27.7	31.75	50.30
28.6	4.92	66.85	28.7	50.97	50.33	28.7	21.80	33.32	28.7	36.11	3.59	28.7	32.01	50.47
29.6	5.03	67.17	29.7	51.58	50.50	29.7	22.00	33.53	29.7	36.30	3.71	29.7	32.27	50.62
30.6	5.15	67.48	30.6	52.15	50.69	30.7	22.22	33.74	30.7	36.49	3.84	30.7	32.53	50.77
31.6	5.27	67.81	31.6	52.70	50.89	31.7	22.43	33.95	31.7	36.67	3.99	31.7	32.81	50.94
9.81 -9.76			30.93 +30.91			10.78 -10.73			9.34 +9.28			12.37 -12.33		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
-84° 9' 9".97			+88° 9' 16".14			-84° 40' 41".95			+83° 51' 30".88			-85° 22' 0".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 14 13	° ' -83 17	Jan.	h m 15 2	° ' +87 32	Jan.	h m 15 24	° ' -84 11	Jan.	h m 16 54	° ' +82 10	Jan.	h m 17 16	° ' -80 46
	s s	"		s s	"		s s	"		s s	"		s s	"
0.8	35.76	25.23	0.9	55.90	35.28	0.9	5.87	32.15	0.9	8.00	16.21	0.9	2.10	64.70
1.8	35.95	25.17	1.8	56.31	35.04	1.9	6.06	32.01	1.9	8.08	15.87	1.9	2.18	64.44
2.8	36.15	25.12	2.8	56.73	34.82	2.9	6.25	31.84	2.9	8.15	15.54	2.9	2.25	64.19
3.8	36.34	25.06	3.8	57.14	34.62	3.9	6.45	31.68	3.9	8.22	15.23	3.9	2.33	63.93
4.8	36.54	24.99	4.8	57.52	34.42	4.9	6.67	31.52	4.9	8.29	14.93	4.9	2.42	63.65
5.8	36.77	24.93	5.8	57.91	34.23	5.8	6.90	31.35	5.9	8.36	14.65	5.9	2.51	63.35
6.8	37.00	24.88	6.8	58.27	34.05	6.8	7.13	31.20	6.9	8.43	14.37	6.9	2.60	63.04
7.8	37.23	24.85	7.8	58.63	33.87	7.8	7.38	31.05	7.9	8.49	14.09	7.9	2.73	62.76
8.8	37.47	24.85	8.8	58.98	33.66	8.8	7.64	30.91	8.9	8.55	13.81	8.9	2.85	62.48
9.8	37.72	24.88	9.8	59.34	33.45	9.8	7.91	30.81	9.9	8.62	13.51	9.9	2.98	62.25
10.8	37.96	24.91	10.8	59.70	33.22	10.8	8.17	30.73	10.9	8.69	13.20	10.9	3.11	62.01
11.8	38.19	24.97	11.8	60.11	33.00	11.8	8.43	30.67	11.9	8.77	12.85	11.9	3.25	61.81
12.8	38.41	25.03	12.8	60.55	32.76	12.8	8.68	30.63	12.9	8.85	12.51	12.9	3.39	61.62
13.8	38.61	25.09	13.8	61.01	32.54	13.8	8.91	30.57	13.9	8.94	12.18	13.9	3.51	61.44
14.8	38.79	25.14	14.8	61.51	32.35	14.8	9.13	30.51	14.9	9.03	11.85	14.9	3.63	61.26
15.8	38.99	25.18	15.8	62.01	32.18	15.8	9.36	30.46	15.9	9.14	11.55	15.9	3.73	61.05
16.8	39.18	25.18	16.8	62.49	32.04	16.8	9.58	30.37	16.9	9.25	11.27	16.9	3.83	60.82
17.8	39.40	25.20	17.8	62.96	31.92	17.8	9.80	30.28	17.9	9.36	11.02	17.9	3.94	60.59
18.8	39.62	25.23	18.8	63.42	31.82	18.8	10.03	30.19	18.9	9.46	10.80	18.9	4.06	60.35
19.8	39.86	25.26	19.8	63.84	31.71	19.8	10.30	30.09	19.9	9.56	10.56	19.9	4.19	60.08
20.8	40.11	25.30	20.8	64.24	31.61	20.8	10.58	30.01	20.9	9.66	10.32	20.9	4.33	59.83
21.8	40.36	25.37	21.8	64.64	31.48	21.8	10.86	29.95	21.9	9.76	10.09	21.9	4.49	59.60
22.8	40.60	25.47	22.8	65.05	31.35	22.8	11.15	29.93	22.9	9.86	9.85	22.9	4.64	59.41
23.8	40.83	25.59	23.8	65.49	31.20	23.8	11.43	29.93	23.9	9.96	9.58	23.9	4.80	59.23
24.7	41.06	25.72	24.8	65.95	31.06	24.8	11.70	29.94	24.9	10.08	9.30	24.9	4.96	59.07
25.7	41.27	25.84	25.8	66.46	30.92	25.8	11.94	29.94	25.9	10.20	9.03	25.9	5.10	58.93
26.7	41.47	25.96	26.8	66.98	30.78	26.8	12.19	29.94	26.9	10.32	8.75	26.9	5.24	58.79
27.7	41.67	26.08	27.8	67.52	30.69	27.8	12.43	29.95	27.9	10.45	8.50	27.9	5.37	58.66
28.7	41.86	26.21	28.8	68.06	30.59	28.8	12.66	29.96	28.8	10.58	8.26	28.9	5.51	58.51
29.7	42.05	26.30	29.8	68.60	30.53	29.8	12.89	29.96	29.8	10.72	8.03	29.9	5.63	58.34
30.7	42.24	26.39	30.8	69.12	30.49	30.8	13.13	29.95	30.8	10.85	7.83	30.9	5.76	58.17
31.7	42.46	26.48	31.8	69.64	30.45	31.8	13.36	29.94	31.8	10.99	7.63	31.9	5.89	58.00
8.56 -8.50			23.32 +23.30			9.88 -9.83			7.34 +7.27			6.24 -6.16		
14 ^h 13 ^m 37 ^s .066			15 ^h 3 ^m 21 ^s .809			15 ^h 24 ^m 9 ^s .966			16 ^h 54 ^m 19 ^s .238			17 ^h 16 ^m 6 ^s .064		
-83° 17' 37''.78			+87° 32' 56''.60			-84° 11' 42''.92			+82° 10' 27''.09			-80° 47' 10''.43		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

β Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
n.	h m s	° ' "	Jan.	h m s	° ' "	Jan.	h m s	° ' "	Jan.	h m s	° ' "	Jan.	h m s	° ' "
	17 58	+86 36		18 6	-87 39		18 59	+89 1		19 28	-89 13		20 48	+82 13
0.9	12.18	47.67	0.9	27.28	48.17	1.0	42.78	11.54	1.0	11.93	22.57	1.1	26.41	58.93
1.9	12.22	47.32	1.9	27.45	47.86	2.0	42.54	11.20	2.0	11.87	22.25	2.1	26.31	58.63
2.9	12.27	46.96	2.9	27.63	47.54	3.0	42.38	10.86	3.0	11.80	21.89	3.1	26.21	58.35
3.9	12.33	46.63	3.9	27.82	47.22	4.0	42.26	10.54	4.0	11.72	21.54	4.1	26.13	58.06
4.9	12.39	46.30	4.9	28.01	46.88	5.0	42.15	10.22	5.0	11.67	21.19	5.1	26.05	57.78
5.9	12.46	46.01	5.9	28.23	46.54	5.9	42.03	9.93	6.0	11.69	20.82	6.1	25.98	57.51
6.9	12.51	45.72	6.9	28.49	46.18	6.9	41.90	9.64	7.0	11.79	20.43	7.1	25.91	57.28
7.9	12.56	45.43	7.9	28.80	45.83	7.9	41.73	9.36	8.0	11.99	20.03	8.1	25.84	57.03
8.9	12.60	45.14	8.9	29.13	45.49	8.9	41.52	9.08	9.0	12.33	19.64	9.1	25.77	56.79
9.9	12.64	44.82	9.9	29.49	45.16	9.9	41.29	8.76	10.0	12.77	19.25	10.1	25.69	56.52
10.9	12.67	44.50	10.9	29.87	44.86	10.9	41.04	8.45	11.0	13.32	18.88	11.1	25.61	56.25
11.9	12.71	44.15	11.9	30.26	44.58	11.9	40.79	8.12	12.0	13.92	18.52	12.1	25.52	55.98
12.9	12.78	43.79	12.9	30.65	44.31	12.9	40.60	7.77	12.9	14.49	18.19	13.1	25.43	55.67
13.9	12.86	43.42	13.9	31.02	44.07	13.9	40.49	7.41	13.9	15.05	17.88	14.1	25.35	55.35
14.9	12.98	43.06	14.9	31.35	43.81	14.9	40.51	7.04	14.9	15.52	17.56	15.0	25.28	55.01
15.9	13.11	42.72	15.9	31.67	43.55	15.9	40.61	6.70	15.9	15.92	17.24	16.0	25.22	54.66
16.9	13.28	42.41	16.9	31.97	43.27	16.9	40.79	6.36	16.9	16.25	16.91	17.0	25.17	54.32
17.9	13.45	42.12	17.9	32.29	42.98	17.9	41.04	6.03	17.9	16.57	16.55	18.0	25.13	54.01
18.9	13.60	41.84	18.9	32.61	42.66	18.9	41.27	5.74	18.9	16.96	16.18	19.0	25.10	53.72
19.9	13.75	41.58	19.9	32.99	42.32	19.9	41.48	5.44	19.9	17.43	15.80	20.0	25.07	53.44
20.9	13.88	41.32	20.9	33.42	41.98	20.9	41.63	5.17	20.9	18.03	15.41	21.0	25.04	53.18
21.9	14.00	41.05	21.9	33.88	41.66	21.9	41.75	4.90	21.9	18.76	15.01	22.0	25.00	52.91
22.9	14.12	40.77	22.9	34.35	41.37	22.9	41.83	4.61	22.9	19.60	14.63	23.0	24.96	52.63
23.9	14.25	40.48	23.9	34.84	41.10	23.9	41.91	4.29	23.9	20.50	14.27	24.0	24.91	52.32
24.9	14.39	40.16	24.9	35.33	40.86	24.9	42.04	3.97	24.9	21.43	13.93	25.0	24.87	52.00
25.9	14.56	39.85	25.9	35.81	40.63	25.9	42.24	3.63	25.9	22.33	13.60	26.0	24.82	51.66
26.9	14.74	39.53	26.9	36.26	40.41	26.9	42.50	3.27	26.9	23.18	13.31	27.0	24.78	51.30
27.9	14.94	39.21	27.9	36.68	40.19	27.9	42.86	2.93	27.9	23.98	13.00	28.0	24.75	50.94
28.9	15.17	38.91	28.9	37.09	39.97	28.9	43.31	2.59	28.9	24.74	12.69	29.0	24.74	50.58
29.9	15.41	38.63	29.9	37.50	39.73	29.9	43.81	2.27	29.9	25.47	12.38	30.0	24.72	50.22
30.9	15.66	38.36	30.9	37.91	39.49	30.9	44.36	1.96	30.9	26.17	12.06	31.0	24.72	49.87
31.9	15.90	38.12	31.9	38.33	39.24	31.9	44.92	1.67	31.9	26.90	11.74	32.0	24.72	49.54
6.92	+16.89		24.52	-24.49		58.38	+58.37		73.60	-73.60		7.40	+7.33	
7 ^h 58 ^m	41°.809		18 ^h 6 ^m	47°.620		19 ^h 1 ^m	27°.463		19 ^h 29 ^m	16°.746		20 ^h 48 ^m	36°.323	
6° 36'	51''.12		-87° 39'	51''.38		+89° 1'	7''.53		-89° 13'	21''.02		+82° 13'	43''.34	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			υ Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 21 38	° ' " -83 5	Jan.	h m 22 16	° ' " -86 23	Jan.	h m 22 37	° ' " -81 48	Jan.	h m 23 27	° ' " +86 51	Jan.	h m 23 47	° ' " -82 28
	s "	"		s "	"		s "	"		s "	"		s "	"
1.1	24.30	59.20	1.1	12.52	19.16	1.2	42.66	54.45	1.2	36.35	45.19	1.2	18.87	41.19
2.1	24.19	58.95	2.1	12.29	18.93	2.2	42.55	54.26	2.2	35.95	45.09	2.2	18.73	41.09
3.1	24.09	58.68	3.1	12.04	18.70	3.2	42.43	54.06	3.2	35.56	45.00	3.2	18.57	40.98
4.1	23.98	58.40	4.1	11.77	18.44	4.2	42.31	53.86	4.2	35.20	44.90	4.2	18.41	40.86
5.1	23.87	58.12	5.1	11.51	18.18	5.2	42.18	53.64	5.2	34.85	44.80	5.2	18.25	40.73
6.1	23.77	57.82	6.1	11.26	17.91	6.1	42.05	53.40	6.2	34.51	44.71	6.2	18.08	40.58
7.1	23.67	57.50	7.1	11.01	17.62	7.1	41.94	53.14	7.2	34.18	44.64	7.2	17.91	40.41
8.1	23.58	57.16	8.1	10.78	17.30	8.1	41.83	52.85	8.2	33.86	44.56	8.2	17.75	40.24
9.1	23.52	56.81	9.1	10.56	16.97	9.1	41.72	52.57	9.2	33.53	44.49	9.2	17.60	40.02
10.1	23.46	56.47	10.1	10.37	16.64	10.1	41.64	52.26	10.2	33.19	44.42	10.2	17.46	39.79
11.1	23.41	56.12	11.1	10.22	16.30	11.1	41.57	51.95	11.2	32.80	44.35	11.2	17.33	39.55
12.1	23.38	55.77	12.1	10.08	15.96	12.1	41.50	51.65	12.2	32.41	44.27	12.2	17.21	39.32
13.1	23.35	55.45	13.1	9.95	15.66	13.1	41.43	51.38	13.2	32.01	44.15	13.2	17.10	39.10
14.1	23.31	55.14	14.1	9.82	15.38	14.1	41.37	51.10	14.2	31.60	44.02	14.2	16.99	38.88
15.1	23.27	54.85	15.1	9.68	15.10	15.1	41.30	50.84	15.2	31.20	43.86	15.2	16.87	38.68
16.1	23.22	54.55	16.1	9.51	14.81	16.1	41.22	50.59	16.2	30.82	43.69	16.2	16.74	38.49
17.1	23.15	54.24	17.1	9.33	14.52	17.1	41.13	50.33	17.2	30.48	43.50	17.2	16.60	38.30
18.1	23.08	53.92	18.1	9.13	14.21	18.1	41.03	50.06	18.2	30.18	43.32	18.2	16.46	38.10
19.1	23.01	53.57	19.1	8.93	13.88	19.1	40.93	49.78	19.1	29.89	43.16	19.2	16.31	37.88
20.1	22.95	53.21	20.1	8.73	13.52	20.1	40.84	49.46	20.1	29.62	43.01	20.2	16.16	37.64
21.1	22.90	52.83	21.1	8.57	13.15	21.1	40.76	49.10	21.1	29.34	42.87	21.2	16.02	37.37
22.1	22.86	52.44	22.1	8.43	12.78	22.1	40.68	48.74	22.1	29.06	42.73	22.2	15.87	37.08
23.1	22.85	52.05	23.1	8.32	12.40	23.1	40.62	48.39	23.1	28.76	42.59	23.2	15.75	36.79
24.1	22.84	51.67	24.1	8.23	12.02	24.1	40.57	48.04	24.1	28.44	42.43	24.1	15.65	36.50
25.1	22.85	51.30	25.1	8.15	11.66	25.1	40.53	47.70	25.1	28.09	42.27	25.1	15.55	36.22
26.1	22.85	50.96	26.1	8.07	11.32	26.1	40.49	47.37	26.1	27.73	42.09	26.1	15.46	35.94
27.1	22.85	50.63	27.1	8.00	10.99	27.1	40.45	47.06	27.1	27.39	41.89	27.1	15.37	35.67
28.0	22.85	50.31	28.1	7.92	10.67	28.1	40.39	46.76	28.1	27.06	41.67	28.1	15.28	35.41
29.0	22.84	49.99	29.1	7.84	10.35	29.1	40.35	46.46	29.1	26.75	41.42	29.1	15.18	35.16
30.0	22.81	49.66	30.1	7.74	10.01	30.1	40.29	46.16	30.1	26.46	41.16	30.1	15.06	34.91
31.0	22.78	49.32	31.1	7.62	9.68	31.1	40.23	45.85	31.1	26.19	40.92	31.1	14.94	34.65
32.0	22.75	48.97	32.1	7.50	9.34	32.1	40.16	45.53	32.1	25.94	40.66	32.1	14.82	34.38
8.32 -8.26			15.87 -15.84			7.02 -6.95			18.27 +18.24			7.64 -7.57		
21 ^h 38 ^m 29 ^s .050			22 ^h 16 ^m 20 ^s .949			22 ^h 37 ^m 45 ^s .323			23 ^h 27 ^m 43 ^s .851			23 ^h 47 ^m 20 ^s .032		
-83° 5' 50".66			-86° 23' 9".03			-81° 48' 43".57			+86° 51' 18".76			-82° 28' 28".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			<i>α</i> Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Feb.	0 57	+85 49	Feb.	1 30	+88 52	Feb.	1 41	−85 11	Feb.	4 10	+85 20	Feb.	5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.2	12.92	31.02	0.2	36.95	29.27	0.2	53.26	14.78	0.3	34.67	41.36	0.4	51.06	46.80
1.2	12.67	30.87	1.2	35.92	29.16	1.2	53.00	14.66	1.3	34.43	41.46	1.4	50.87	47.00
2.2	12.42	30.72	2.2	34.94	29.06	2.2	52.72	14.53	2.3	34.20	41.55	2.4	50.69	47.19
3.2	12.19	30.57	3.2	34.01	28.95	3.2	52.44	14.38	3.3	33.97	41.63	3.4	50.52	47.37
4.2	11.96	30.41	4.2	33.12	28.85	4.2	52.15	14.22	4.3	33.76	41.72	4.4	50.37	47.55
5.2	11.75	30.28	5.2	32.22	28.75	5.2	51.87	14.04	5.3	33.56	41.82	5.4	50.22	47.74
6.2	11.53	30.17	6.2	31.31	28.67	6.2	51.59	13.83	6.3	33.37	41.93	6.4	50.07	47.94
7.2	11.29	30.06	7.2	30.37	28.60	7.2	51.33	13.61	7.3	33.16	42.05	7.4	49.93	48.15
8.2	11.05	29.93	8.2	29.36	28.53	8.2	51.09	13.38	8.3	32.94	42.18	8.3	49.78	48.37
9.2	10.79	29.79	9.2	28.30	28.45	9.2	50.86	13.13	9.3	32.71	42.32	9.3	49.61	48.60
10.2	10.51	29.64	10.2	27.20	28.36	10.2	50.64	12.89	10.3	32.46	42.45	10.3	49.43	48.83
11.1	10.23	29.46	11.2	26.08	28.23	11.2	50.43	12.65	11.3	32.20	42.56	11.3	49.22	49.04
12.1	9.96	29.26	12.2	24.99	28.08	12.2	50.21	12.45	12.3	31.93	42.65	12.3	48.99	49.24
13.1	9.72	29.05	13.2	23.97	27.90	13.2	49.99	12.26	13.3	31.64	42.70	13.3	48.76	49.42
14.1	9.48	28.83	14.2	23.04	27.71	14.2	49.75	12.08	14.3	31.37	42.72	14.3	48.53	49.57
15.1	9.29	28.61	15.2	22.18	27.53	15.2	49.50	11.88	15.3	31.13	42.72	15.3	48.31	49.68
16.1	9.10	28.40	16.2	21.37	27.34	16.2	49.23	11.67	16.3	30.88	42.72	16.3	48.10	49.79
17.1	8.94	28.19	17.2	20.65	27.16	17.2	48.95	11.44	17.3	30.66	42.73	17.3	47.91	49.89
18.1	8.77	27.98	18.2	19.91	27.00	18.2	48.70	11.18	18.3	30.45	42.76	18.3	47.73	50.00
19.1	8.60	27.79	19.1	19.12	26.84	19.2	48.45	10.91	19.3	30.24	42.80	19.3	47.55	50.13
20.1	8.40	27.61	20.1	18.30	26.69	20.2	48.21	10.62	20.3	30.02	42.85	20.3	47.37	50.27
21.1	8.19	27.41	21.1	17.42	26.54	21.2	48.01	10.32	21.3	29.77	42.90	21.3	47.17	50.43
22.1	7.97	27.20	22.1	16.48	26.38	22.1	47.81	10.03	22.3	29.52	42.95	22.3	46.96	50.59
23.1	7.75	26.96	23.1	15.53	26.20	23.1	47.63	9.75	23.2	29.26	42.98	23.3	46.73	50.74
24.1	7.52	26.73	24.1	14.58	26.01	24.1	47.44	9.47	24.2	28.97	42.99	24.3	46.48	50.89
25.1	7.30	26.47	25.1	13.66	25.77	25.1	47.26	9.22	25.2	28.69	42.99	25.3	46.22	51.01
26.1	7.10	26.18	26.1	12.78	25.52	26.1	47.06	8.97	26.2	28.40	42.96	26.3	45.96	51.11
27.1	6.91	25.90	27.1	11.95	25.27	27.1	46.86	8.72	27.2	28.10	42.92	27.3	45.70	51.20
28.1	6.75	25.61	28.1	11.19	25.02	28.1	46.66	8.47	28.2	27.83	42.86	28.3	45.43	51.26
29.1	6.60	25.32	29.1	10.49	24.76	29.1	46.44	8.21	29.2	27.56	42.78	29.3	45.16	51.31
30.1	6.46	25.03	30.1	9.84	24.51	30.1	46.22	7.94	30.2	27.31	42.70	30.3	44.91	51.35
31.1	6.34	24.75	31.1	9.24	24.26	31.1	46.00	7.68	31.2	27.08	42.62	31.3	44.69	51.39
13.74 +13.70			50.90 +50.89			11.92 −11.88			12.32 +12.28			11.86 +11.82		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .554		
+85° 49' 4''.72			+88° 52' 2''.06			−85° 11' 3''.34			+85° 20' 19''.62			+85° 9' 32''.39		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

81 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Feb.	5 46	-84 49	Feb.	6 46	-80 43	Feb.	7 3	+87 10	Feb.	7 14	+82 34	Feb.	7 16	-86 54
	s	"		s	"		s	"		s	"		s	"
0.4	8.58	58.82	0.4	58.63	53.81	0.4	10.95	54.39	0.4	10.43	27.00	0.4	13.76	23.26
1.4	8.38	59.07	1.4	58.55	54.13	1.4	10.77	54.68	1.4	10.36	27.28	1.4	13.54	23.60
2.4	8.16	59.33	2.4	58.46	54.45	2.4	10.58	54.96	2.4	10.30	27.55	2.4	13.32	23.95
3.4	7.94	59.58	3.4	58.38	54.78	3.4	10.40	55.21	3.4	10.24	27.80	3.4	13.09	24.31
4.4	7.71	59.82	4.4	58.28	55.11	4.4	10.25	55.45	4.4	10.19	28.03	4.4	12.83	24.66
5.4	7.44	60.06	5.4	58.18	55.43	5.4	10.11	55.69	5.4	10.15	28.28	5.4	12.55	25.00
6.4	7.19	60.26	6.4	58.07	55.74	6.4	9.97	55.95	6.4	10.12	28.54	6.4	12.24	25.34
7.4	6.93	60.45	7.4	57.95	56.02	7.4	9.84	56.23	7.4	10.08	28.80	7.4	11.92	25.65
8.4	6.67	60.61	8.4	57.84	56.29	8.4	9.71	56.51	8.4	10.05	29.08	8.4	11.58	25.93
9.4	6.41	60.75	9.4	57.72	56.53	9.4	9.57	56.82	9.4	10.01	29.39	9.4	11.25	26.20
10.4	6.17	60.88	10.4	57.59	56.76	10.4	9.39	57.13	10.4	9.95	29.70	10.4	10.92	26.46
11.3	5.93	61.02	11.4	57.49	56.99	11.4	9.16	57.43	11.4	9.87	30.00	11.4	10.60	26.72
12.3	5.69	61.19	12.4	57.38	57.22	12.4	8.90	57.72	12.4	9.79	30.29	12.4	10.32	26.98
13.3	5.46	61.36	13.4	57.27	57.46	13.4	8.62	57.99	13.4	9.69	30.56	13.4	10.03	27.25
14.3	5.23	61.54	14.4	57.16	57.73	14.4	8.32	58.23	14.4	9.58	30.79	14.4	9.75	27.54
15.3	4.99	61.74	15.4	57.06	58.02	15.4	8.03	58.46	15.4	9.48	31.02	15.4	9.44	27.86
16.3	4.72	61.94	16.4	56.94	58.31	16.4	7.75	58.66	16.4	9.39	31.22	16.4	9.14	28.18
17.3	4.45	62.13	17.4	56.82	58.59	17.4	7.50	58.85	17.4	9.30	31.41	17.4	8.81	28.51
18.3	4.17	62.31	18.4	56.68	58.87	18.4	7.26	59.04	18.4	9.23	31.62	18.4	8.44	28.82
19.3	3.89	62.45	19.4	56.55	59.12	19.4	7.04	59.26	19.4	9.16	31.84	19.4	8.06	29.11
20.3	3.60	62.58	20.4	56.41	59.35	20.4	6.82	59.49	20.4	9.08	32.06	20.4	7.66	29.38
21.3	3.31	62.68	21.4	56.28	59.55	21.4	6.58	59.74	21.4	9.00	32.30	21.4	7.26	29.61
22.3	3.03	62.76	22.4	56.15	59.73	22.4	6.31	59.99	22.4	8.92	32.57	22.4	6.88	29.83
23.3	2.76	62.84	23.4	56.01	59.91	23.4	6.02	60.24	23.4	8.81	32.83	23.4	6.51	30.04
24.3	2.50	62.92	24.4	55.89	60.09	24.4	5.70	60.49	24.4	8.69	33.08	24.4	6.14	30.26
25.3	2.26	63.01	25.4	55.75	60.27	25.4	5.34	60.74	25.4	8.57	33.32	25.4	5.79	30.47
26.3	2.00	63.11	26.3	55.63	60.45	26.4	4.98	60.96	26.4	8.44	33.56	26.4	5.44	30.69
27.3	1.74	63.21	27.3	55.50	60.64	27.4	4.60	61.16	27.4	8.30	33.77	27.4	5.10	30.91
28.3	1.49	63.33	28.3	55.38	60.84	28.4	4.21	61.34	28.4	8.15	33.96	28.4	4.76	31.14
29.3	1.23	63.45	29.3	55.25	61.06	29.4	3.82	61.51	29.4	8.01	34.14	29.4	4.40	31.38
30.3	0.96	63.56	30.3	55.12	61.27	30.3	3.45	61.65	30.4	7.88	34.30	30.4	4.03	31.65
31.3	0.68	63.69	31.3	54.98	61.49	31.3	3.09	61.80	31.4	7.75	34.45	31.4	3.65	31.91
11.11	-11.06		6.21	-6.13		20.35	+20.32		7.74	+7.67		18.54	-18.51	
5 ^h 46 ^m	3 ^s .075		6 ^h 46 ^m	53 ^s .600		7 ^h 2 ^m	33 ^s .206		7 ^h 13 ^m	55 ^s .106		7 ^h 16 ^m	0 ^s .004	
-84° 49'	45'' .59		-80° 43'	42'' .15		+87° 10'	49'' .32		+82° 34'	23'' .73		-86° 54'	13'' .24	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m 8 18	° ' " +88 52	Feb.	h m 9 8	° ' " −85 20	Feb.	h m 9 25	° ' " +81 41	Feb.	h m 9 36	° ' " −80 34	Feb.	h m 10 21	° ' " +82 58
0.5	22.06	45.47	0.5	62.16	16.46	0.5	43.37	13.82	0.5	27.72	26.26	0.6	25.48	18.35
1.5	21.92	45.80	1.5	62.17	16.82	1.5	43.40	14.10	1.5	27.75	26.63	1.6	25.56	18.63
2.5	21.76	46.10	2.5	62.18	17.20	2.5	43.41	14.39	2.5	27.76	27.04	2.6	25.61	18.90
3.5	21.61	46.39	3.5	62.18	17.61	3.5	43.44	14.66	3.5	27.78	27.44	3.6	25.69	19.14
4.5	21.50	46.67	4.5	62.17	18.03	4.5	43.47	14.92	4.5	27.80	27.87	4.6	25.76	19.39
5.5	21.41	46.94	5.5	62.14	18.45	5.5	43.51	15.18	5.5	27.82	28.30	5.6	25.83	19.63
6.5	21.37	47.22	6.5	62.09	18.88	6.5	43.55	15.44	6.5	27.82	28.73	6.6	25.92	19.87
7.5	21.36	47.51	7.5	62.01	19.30	7.5	43.60	15.71	7.5	27.82	29.16	7.6	26.02	20.11
8.5	21.36	47.83	8.5	61.93	19.69	8.5	43.65	16.00	8.5	27.81	29.56	8.5	26.11	20.37
9.5	21.32	48.15	9.5	61.85	20.07	9.5	43.71	16.30	9.5	27.79	29.95	9.5	26.20	20.64
10.5	21.21	48.49	10.5	61.76	20.43	10.5	43.75	16.62	10.5	27.77	30.33	10.5	26.30	20.95
11.5	21.01	48.85	11.5	61.68	20.77	11.5	43.77	16.95	11.5	27.75	30.69	11.5	26.38	21.27
12.4	20.71	49.19	12.5	61.60	21.11	12.5	43.78	17.29	12.5	27.73	31.06	12.5	26.43	21.60
13.4	20.34	49.51	13.5	61.55	21.46	13.5	43.77	17.63	13.5	27.72	31.43	13.5	26.47	21.92
14.4	19.89	49.79	14.5	61.51	21.83	14.5	43.76	17.94	14.5	27.71	31.81	14.5	26.50	22.23
15.4	19.44	50.07	15.5	61.46	22.22	15.5	43.75	18.23	15.5	27.70	32.22	15.5	26.51	22.52
16.4	18.99	50.33	16.5	61.40	22.63	16.5	43.73	18.52	16.5	27.70	32.63	16.5	26.53	22.81
17.4	18.60	50.57	17.5	61.32	23.05	17.5	43.72	18.77	17.5	27.69	33.06	17.5	26.56	23.08
18.4	18.25	50.83	18.5	61.24	23.47	18.5	43.72	19.01	18.5	27.68	33.50	18.5	26.59	23.34
19.4	17.95	51.09	19.5	61.13	23.88	19.5	43.73	19.28	19.5	27.64	33.93	19.5	26.63	23.60
20.4	17.66	51.38	20.5	61.00	24.26	20.5	43.74	19.56	20.5	27.60	34.32	20.5	26.68	23.87
21.4	17.34	51.67	21.5	60.86	24.62	21.5	43.75	19.86	21.5	27.56	34.71	21.5	26.72	24.16
22.4	16.98	51.99	22.5	60.73	24.97	22.5	43.75	20.18	22.5	27.52	35.08	22.5	26.76	24.47
23.4	16.55	52.32	23.5	60.58	25.30	23.5	43.74	20.51	23.5	27.47	35.43	23.5	26.80	24.80
24.4	16.06	52.64	24.5	60.45	25.64	24.5	43.71	20.85	24.5	27.42	35.76	24.5	26.82	25.14
25.4	15.48	52.93	25.4	60.33	25.96	25.5	43.68	21.18	25.5	27.37	36.10	25.5	26.83	25.50
26.4	14.85	53.22	26.4	60.20	26.29	26.5	43.64	21.51	26.5	27.33	36.46	26.5	26.83	25.84
27.4	14.16	53.50	27.4	60.10	26.63	27.5	43.59	21.83	27.5	27.30	36.81	27.5	26.81	26.17
28.4	13.44	53.77	28.4	59.99	26.98	28.5	43.54	22.13	28.5	27.25	37.17	28.5	26.78	26.50
29.4	12.71	54.02	29.4	59.88	27.34	29.5	43.48	22.42	29.5	27.21	37.53	29.5	26.75	26.82
30.4	11.98	54.26	30.4	59.75	27.70	30.4	43.42	22.70	30.5	27.18	37.90	30.5	26.73	27.13
31.4	11.28	54.49	31.4	59.63	28.07	31.4	43.36	22.96	31.5	27.14	38.29	31.5	26.70	27.42
51.19 +51.18			12.31 −12.27			6.92 +6.84			6.11 −6.02			8.17 +8.11		
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
+88° 52′ 49″.08			−85° 20′ 12″.12			+81° 41′ 25″.82			−80° 34′ 23″.04			+82° 58′ 35″.87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m 11 0	° ' -84 9	Feb.	h m 12 14	° ' +88 8	Feb.	h m 12 46	° ' -84 40	Feb.	h m 12 48	° ' +83 51	Feb.	h m 13 27	° ' -85 21
	s "	"		s "	"		s "	"		s "	"		s "	"
0.6	5.27	7.81	0.6	52.70	50.89	0.7	22.43	33.95	0.7	36.67	3.99	0.7	32.81	50.94
1.6	5.39	8.14	1.6	53.21	51.09	1.7	22.66	34.17	1.7	36.85	4.14	1.7	33.09	51.10
2.6	5.52	8.49	2.6	53.69	51.29	2.7	22.90	34.40	2.7	37.02	4.28	2.7	33.39	51.28
3.6	5.64	8.86	3.6	54.16	51.47	3.7	23.13	34.66	3.7	37.19	4.41	3.7	33.70	51.47
4.6	5.75	9.23	4.6	54.63	51.65	4.7	23.37	34.93	4.7	37.35	4.54	4.7	34.01	51.69
5.6	5.86	9.64	5.6	55.12	51.80	5.7	23.60	35.21	5.7	37.51	4.67	5.7	34.30	51.91
6.6	5.96	10.05	6.6	55.62	51.95	6.7	23.83	35.53	6.7	37.68	4.76	6.7	34.59	52.18
7.6	6.02	10.46	7.6	56.16	52.12	7.6	24.03	35.87	7.7	37.87	4.88	7.7	34.88	52.44
8.6	6.08	10.86	8.6	56.72	52.28	8.6	24.22	36.19	8.6	38.06	5.00	8.7	35.12	52.72
9.6	6.14	11.24	9.6	57.31	52.46	9.6	24.39	36.51	9.6	38.26	5.14	9.7	35.37	53.00
10.6	6.20	11.62	10.6	57.89	52.67	10.6	24.56	36.80	10.6	38.46	5.31	10.7	35.60	53.26
11.6	6.24	11.98	11.6	58.45	52.90	11.6	24.72	37.09	11.6	38.65	5.48	11.7	35.82	53.50
12.6	6.29	12.34	12.6	58.96	53.14	12.6	24.88	37.38	12.6	38.83	5.68	12.7	36.04	53.73
13.6	6.37	12.69	13.6	59.41	53.40	13.6	25.05	37.64	13.6	38.99	5.90	13.7	36.28	53.95
14.6	6.44	13.04	14.6	59.80	53.67	14.6	25.25	37.91	14.6	39.13	6.12	14.7	36.55	54.16
15.6	6.52	13.42	15.6	60.16	53.91	15.6	25.45	38.21	15.6	39.27	6.35	15.7	36.81	54.39
16.6	6.61	13.82	16.6	60.49	54.15	16.6	25.67	38.52	16.6	39.39	6.57	16.7	37.09	54.65
17.5	6.69	14.23	17.6	60.82	54.38	17.6	25.87	38.83	17.6	39.51	6.77	17.7	37.37	54.93
18.5	6.75	14.66	18.6	61.16	54.61	18.6	26.07	39.18	18.6	39.65	6.95	18.6	37.65	55.23
19.5	6.80	15.09	19.6	61.55	54.83	19.6	26.26	39.55	19.6	39.79	7.13	19.6	37.90	55.54
20.5	6.83	15.52	20.6	61.96	55.05	20.6	26.42	39.92	20.6	39.94	7.30	20.6	38.13	55.86
21.5	6.85	15.93	21.6	62.39	55.28	21.6	26.57	40.28	21.6	40.11	7.49	21.6	38.36	56.19
22.5	6.86	16.34	22.6	62.84	55.52	22.6	26.71	40.64	22.6	40.27	7.71	22.6	38.55	56.50
23.5	6.87	16.71	23.6	63.27	55.79	23.6	26.83	40.97	23.6	40.42	7.94	23.6	38.75	56.80
24.5	6.88	17.08	24.6	63.69	56.09	24.6	26.95	41.30	24.6	40.57	8.17	24.6	38.93	57.09
25.5	6.89	17.45	25.6	64.05	56.40	25.6	27.07	41.62	25.6	40.72	8.44	25.6	39.11	57.37
26.5	6.90	17.80	26.6	64.38	56.71	26.6	27.20	41.93	26.6	40.84	8.72	26.6	39.31	57.64
27.5	6.93	18.16	27.6	64.67	57.03	27.6	27.34	42.25	27.6	40.96	9.00	27.6	39.51	57.92
28.5	6.95	18.52	28.6	64.92	57.34	28.6	27.48	42.55	28.6	41.06	9.29	28.6	39.71	58.18
29.5	6.98	18.90	29.6	65.15	57.65	29.6	27.63	42.86	29.6	41.15	9.57	29.6	39.93	58.46
30.5	7.01	19.30	30.6	65.33	57.95	30.6	27.78	43.21	30.6	41.24	9.85	30.6	40.15	58.77
31.5	7.03	19.71	31.6	65.51	58.24	31.6	27.94	43.57	31.6	41.32	10.12	31.6	40.38	59.09
9.82 -9.77			30.95 +30.93			10.78 -10.73			9.34 +9.28			12.38 -12.34		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
-84° 9' 9".97			+88° 9' 16".14			-84° 40' 41".95			+83° 51' 30".88			-85° 22' 0".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
sh. no.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
b.	14 13	−83 17	Feb.	15 3	+87 32	Feb.	15 24	−84 11	Feb.	16 54	+82 10	Feb.	17 16	−80 46
	s	"		s	"		s	"		s	"		s	"
0.7	42.46	26.48	0.8	9.64	30.45	0.8	13.36	29.94	0.8	10.99	7.63	0.9	5.89	58.00
1.7	42.67	26.57	1.8	10.13	30.44	1.8	13.62	29.94	1.8	11.13	7.45	1.9	6.02	57.82
2.7	42.89	26.67	2.8	10.61	30.43	2.8	13.88	29.91	2.8	11.27	7.28	2.9	6.16	57.63
3.7	43.12	26.80	3.8	11.06	30.40	3.8	14.15	29.90	3.8	11.40	7.12	3.8	6.32	57.44
4.7	43.35	26.94	4.8	11.51	30.37	4.8	14.43	29.92	4.8	11.53	6.96	4.8	6.49	57.28
5.7	43.58	27.12	5.7	11.96	30.34	5.8	14.73	29.96	5.8	11.66	6.79	5.8	6.66	57.12
6.7	43.81	27.30	6.7	12.42	30.29	6.8	15.02	30.03	6.8	11.79	6.61	6.8	6.84	56.99
7.7	44.04	27.52	7.7	12.88	30.24	7.8	15.29	30.11	7.8	11.92	6.42	7.8	7.01	56.89
8.7	44.26	27.74	8.7	13.38	30.19	8.8	15.56	30.20	8.8	12.05	6.21	8.8	7.19	56.80
9.7	44.45	27.94	9.7	13.91	30.13	9.8	15.82	30.31	9.8	12.20	6.01	9.8	7.36	56.72
0.7	44.63	28.13	10.7	14.46	30.10	10.8	16.06	30.42	10.8	12.34	5.81	10.8	7.51	56.65
1.7	44.81	28.32	11.7	15.02	30.10	11.7	16.30	30.51	11.8	12.51	5.64	11.8	7.66	56.58
2.7	44.99	28.50	12.7	15.58	30.13	12.7	16.53	30.57	12.8	12.67	5.50	12.8	7.80	56.49
3.7	45.17	28.66	13.7	16.09	30.16	13.7	16.76	30.63	13.8	12.83	5.37	13.8	7.94	56.39
4.7	45.37	28.82	14.7	16.60	30.22	14.7	17.02	30.68	14.8	12.98	5.28	14.8	8.08	56.26
5.7	45.59	28.99	15.7	17.06	30.30	15.7	17.28	30.72	15.8	13.13	5.19	15.8	8.25	56.14
6.7	45.81	29.18	16.7	17.49	30.38	16.7	17.56	30.80	16.8	13.28	5.11	16.8	8.41	56.01
7.7	46.04	29.38	17.7	17.92	30.43	17.7	17.84	30.88	17.8	13.43	5.04	17.8	8.59	55.91
8.7	46.26	29.61	18.7	18.34	30.48	18.7	18.13	30.98	18.8	13.57	4.96	18.8	8.78	55.81
9.7	46.47	29.87	19.7	18.80	30.51	19.7	18.41	31.11	19.8	13.71	4.86	19.8	8.96	55.75
0.7	46.67	30.13	20.7	19.27	30.54	20.7	18.68	31.25	20.8	13.85	4.73	20.8	9.15	55.70
1.7	46.86	30.40	21.7	19.76	30.57	21.7	18.93	31.41	21.8	14.02	4.61	21.8	9.33	55.68
2.7	47.04	30.65	22.7	20.27	30.62	22.7	19.17	31.56	22.8	14.18	4.49	22.8	9.50	55.66
3.7	47.19	30.91	23.7	20.81	30.69	23.7	19.40	31.71	23.8	14.35	4.39	23.8	9.65	55.64
4.7	47.34	31.16	24.7	21.35	30.78	24.7	19.63	31.86	24.8	14.52	4.31	24.8	9.80	55.62
5.7	47.51	31.38	25.7	21.87	30.88	25.7	19.85	32.00	25.8	14.69	4.25	25.8	9.96	55.58
6.7	47.67	31.61	26.7	22.39	31.01	26.7	20.07	32.12	26.8	14.86	4.19	26.8	10.11	55.54
7.7	47.84	31.81	27.7	22.87	31.15	27.7	20.29	32.23	27.8	15.03	4.17	27.8	10.25	55.49
8.7	48.01	32.03	28.7	23.35	31.32	28.7	20.52	32.36	28.8	15.20	4.16	28.8	10.40	55.44
9.7	48.18	32.26	29.7	23.79	31.48	29.7	20.77	32.49	29.8	15.36	4.16	29.8	10.57	55.38
0.6	48.37	32.50	30.7	24.21	31.65	30.7	21.01	32.62	30.8	15.52	4.17	30.8	10.73	55.32
1.6	48.56	32.75	31.7	24.62	31.80	31.7	21.28	32.76	31.8	15.67	4.20	31.8	10.91	55.28
8.56 −8.50			23.31 +23.29			9.88 −9.83			7.34 +7.27			6.24 −6.16		
4 ^h 13 ^m 37 ^s .066			15 ^h 3 ^m 21 ^s .809			15 ^h 24 ^m 9 ^s .966			16 ^h 54 ^m 19 ^s .238			17 ^h 16 ^m 6 ^s .064		
3° 17' 37''.78			+87° 32' 56''.60			−84° 11' 42''.92			+82° 10' 27''.09			−80° 47' 10''.43		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Deci- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Feb.	17 58	+86 36	Feb.	18 6	-87 39	Feb.	18 59	+89 0	Feb.	19 28	-89 13	Feb.	20 48	+82
	s	"		s	"		s	"		s	"		s	"
0.9	15.90	38.12	0.9	38.33	39.24	0.9	44.92	61.67	0.9	26.90	11.74	1.0	24.72	49
1.9	16.15	37.88	1.9	38.77	38.98	1.9	45.50	61.38	1.9	27.66	11.40	2.0	24.72	49
2.9	16.40	37.68	2.9	39.23	38.71	2.9	46.07	61.10	2.9	28.50	11.06	2.9	24.74	48
3.9	16.63	37.48	3.9	39.73	38.44	3.9	46.63	60.85	3.9	29.43	10.70	3.9	24.75	48
4.9	16.86	37.25	4.9	40.27	38.17	4.9	47.12	60.59	4.9	30.47	10.36	4.9	24.76	48
5.9	17.08	37.03	5.9	40.83	37.94	5.9	47.58	60.34	5.9	31.61	10.02	5.9	24.76	48
6.9	17.28	36.79	6.9	41.43	37.74	6.9	48.00	60.08	6.9	32.85	9.69	6.9	24.77	47
7.9	17.50	36.55	7.9	42.02	37.53	7.9	48.44	59.79	7.9	34.17	9.38	7.9	24.76	47
8.9	17.72	36.28	8.9	42.61	37.34	8.9	48.89	59.48	8.9	35.51	9.09	8.9	24.76	47
9.9	17.98	36.01	9.9	43.18	37.18	9.9	49.42	59.17	9.9	36.82	8.82	9.9	24.76	46
10.9	18.25	35.75	10.9	43.73	37.02	10.9	50.04	58.85	10.9	38.05	8.55	10.9	24.77	46
11.9	18.54	35.51	11.9	44.25	36.86	11.9	50.75	58.56	11.9	39.20	8.29	11.9	24.78	46
12.9	18.86	35.27	12.9	44.73	36.70	12.9	51.57	58.27	12.9	40.28	8.01	12.9	24.82	45
13.8	19.17	35.07	13.9	45.23	36.51	13.9	52.44	58.02	13.9	41.31	7.71	13.9	24.86	45
14.8	19.49	34.91	14.9	45.73	36.28	14.9	53.31	57.79	14.9	42.36	7.39	14.9	24.91	45
15.8	19.80	34.77	15.9	46.28	36.07	15.9	54.15	57.58	15.9	43.49	7.06	15.9	24.97	44
16.8	20.09	34.63	16.8	46.86	35.84	16.9	54.95	57.39	16.9	44.73	6.73	16.9	25.02	44
17.8	20.37	34.48	17.8	47.49	35.64	17.9	55.72	57.19	17.9	46.09	6.41	17.9	25.07	44
18.8	20.64	34.31	18.8	48.13	35.44	18.9	56.43	56.97	18.9	47.56	6.09	18.9	25.11	43
19.8	20.91	34.14	19.8	48.78	35.29	19.9	57.12	56.74	19.9	49.08	5.81	19.9	25.15	43
20.8	21.18	33.96	20.8	49.43	35.14	20.9	57.84	56.51	20.9	50.63	5.54	20.9	25.19	43
21.8	21.49	33.77	21.8	50.06	35.03	21.9	58.60	56.26	21.9	52.18	5.31	21.9	25.24	42
22.8	21.80	33.58	22.8	50.67	34.92	22.9	59.43	56.00	22.9	53.69	5.06	22.9	25.28	42
23.8	22.13	33.40	23.8	51.25	34.81	23.9	60.35	55.74	23.9	55.12	4.83	23.9	25.33	42
24.8	22.48	33.22	24.8	51.81	34.70	24.9	61.34	55.50	24.9	56.49	4.61	24.9	25.39	41
25.8	22.84	33.08	25.8	52.36	34.59	25.9	62.39	55.26	25.9	57.82	4.39	25.9	25.45	41
26.8	23.22	32.94	26.8	52.91	34.46	26.9	63.47	55.05	26.9	59.12	4.16	26.9	25.53	41
27.8	23.59	32.82	27.8	53.45	34.33	27.9	64.59	54.85	27.9	60.42	3.93	27.9	25.61	41
28.8	23.96	32.72	28.8	54.00	34.19	28.9	65.71	54.68	28.9	61.73	3.66	28.9	25.71	40
29.8	24.32	32.64	29.8	54.59	34.05	29.8	66.82	54.52	29.9	63.10	3.40	29.9	25.80	40
30.8	24.67	32.58	30.8	55.18	33.90	30.8	67.89	54.35	30.9	64.55	3.14	30.9	25.90	40
31.8	25.01	32.52	31.8	55.82	33.75	31.8	68.93	54.21	31.9	66.07	2.88	31.9	25.99	39
16.91 +16.88			24.49 -24.47			58.23 +58.22			73.33 -73.32			7.40 +7.33		
17 ^h 58 ^m 41 ^s .809			18 ^h 6 ^m 47 ^s .620			19 ^h 1 ^m 27 ^s .463			19 ^h 29 ^m 16 ^s .746			20 ^h 48 ^m 36 ^s .3		
+86° 36' 51".12			-87° 39' 51".38			+89° 1' 7".53			-89° 13' 21".02			+82° 13' 43".3		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ ¹ Octantis. Mag. 5.1		
sh. no.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
b.	21 38	−83 5	Feb.	22 16	−86 22	Feb.	22 37	−81 48	Feb.	23 27	+86 51	Feb.	23 47	−82 28
	s	"		s	"		s	"		s	"		s	"
1.0	22.75	48.97	1.1	7.50	69.34	1.1	40.16	45.53	1.1	25.94	40.66	1.1	14.82	34.38
2.0	22.73	48.61	2.1	7.39	68.97	2.1	40.10	45.19	2.1	25.71	40.41	2.1	14.70	34.11
3.0	22.71	48.23	3.1	7.28	68.60	3.1	40.04	44.84	3.1	25.49	40.17	3.1	14.58	33.82
4.0	22.70	47.84	4.1	7.18	68.21	4.1	39.98	44.48	4.1	25.27	39.94	4.1	14.47	33.51
5.0	22.70	47.44	5.1	7.11	67.79	5.1	39.93	44.10	5.1	25.06	39.73	5.1	14.36	33.18
6.0	22.72	47.04	6.0	7.06	67.39	6.1	39.90	43.71	6.1	24.85	39.52	6.1	14.27	32.83
7.0	22.76	46.63	7.0	7.04	66.99	7.1	39.89	43.32	7.1	24.61	39.31	7.1	14.19	32.48
8.0	22.81	46.24	8.0	7.04	66.59	8.1	39.88	42.93	8.1	24.35	39.09	8.1	14.12	32.12
9.0	22.86	45.87	9.0	7.06	66.20	9.1	39.88	42.54	9.1	24.08	38.86	9.1	14.05	31.77
0.0	22.91	45.52	10.0	7.09	65.82	10.1	39.88	42.19	10.1	23.80	38.60	10.1	13.99	31.43
1.0	22.95	45.18	11.0	7.11	65.47	11.1	39.88	41.85	11.1	23.55	38.33	11.1	13.93	31.11
2.0	22.98	44.83	12.0	7.11	65.13	12.0	39.86	41.52	12.1	23.31	38.04	12.1	13.86	30.81
3.0	23.00	44.49	13.0	7.08	64.79	13.0	39.83	41.19	13.1	23.10	37.73	13.1	13.78	30.51
4.0	23.02	44.14	14.0	7.04	64.43	14.0	39.79	40.84	14.1	22.92	37.42	14.1	13.70	30.20
4.9	23.04	43.78	15.0	7.00	64.06	15.0	39.76	40.48	15.1	22.78	37.12	15.1	13.61	29.88
5.9	23.05	43.40	16.0	6.95	63.65	16.0	39.73	40.11	16.1	22.66	36.84	16.1	13.51	29.55
6.9	23.08	42.99	17.0	6.92	63.24	17.0	39.70	39.71	17.1	22.54	36.57	17.1	13.42	29.19
7.9	23.12	42.58	18.0	6.92	62.82	18.0	39.70	39.30	18.1	22.42	36.31	18.1	13.34	28.81
8.9	23.18	42.16	19.0	6.95	62.38	19.0	39.70	38.88	19.1	22.28	36.07	19.1	13.28	28.41
9.9	23.25	41.74	20.0	7.00	61.97	20.0	39.71	38.47	20.1	22.13	35.82	20.1	13.23	28.02
0.9	23.34	41.35	21.0	7.08	61.58	21.0	39.73	38.08	21.1	21.96	35.56	21.1	13.19	27.64
1.9	23.43	40.99	22.0	7.17	61.20	22.0	39.75	37.70	22.1	21.78	35.27	22.1	13.15	27.26
2.9	23.51	40.65	23.0	7.25	60.83	23.0	39.78	37.33	23.1	21.60	34.96	23.1	13.12	26.90
3.9	23.58	40.32	24.0	7.32	60.48	24.0	39.80	36.98	24.0	21.44	34.64	24.1	13.08	26.55
4.9	23.64	40.00	24.9	7.39	60.13	25.0	39.81	36.64	25.0	21.29	34.31	25.1	13.04	26.21
5.9	23.70	39.68	25.9	7.45	59.78	26.0	39.82	36.30	26.0	21.17	33.98	26.1	12.99	25.88
6.9	23.76	39.35	26.9	7.49	59.42	27.0	39.83	35.95	27.0	21.07	33.65	27.1	12.95	25.55
7.9	23.81	39.00	27.9	7.52	59.06	28.0	39.83	35.59	28.0	21.00	33.30	28.1	12.90	25.22
8.9	23.86	38.64	28.9	7.56	58.69	29.0	39.83	35.22	29.0	20.94	32.95	29.1	12.84	24.87
9.9	23.92	38.28	29.9	7.60	58.29	29.9	39.83	34.85	30.0	20.91	32.62	30.0	12.79	24.51
0.9	23.98	37.90	30.9	7.65	57.89	30.9	39.84	34.45	31.0	20.88	32.31	31.0	12.73	24.13
1.9	24.06	37.52	31.9	7.72	57.49	31.9	39.87	34.04	32.0	20.87	32.02	32.0	12.69	23.74
8.32	−8.26		15.86	−15.83		7.02	−6.95		18.26	+18.23		7.64	−7.57	
1 ^h 38 ^m	29 ^s .050		22 ^h 16 ^m	20 ^s .949		22 ^h 37 ^m	45 ^s .323		23 ^h 27 ^m	43 ^s .851		23 ^h 47 ^m	20 ^s .032	
3° 5'	50''.66		−86° 23'	9''.03		−81° 48'	43''.57		+86° 51'	18''.76		−82° 28'	28''.42	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			<i>α</i> Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 9 Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	De- nat.
Mar.	h m s	° ' "	Mar.	h m s	° ' "	Mar.	h m s	° ' "	Mar.	h m s	° ' "	Mar.	h m s	
	0 57	+85 49		1 29	+88 52		1 41	-85 10		4 10	+85 20		5 35	+85
0.1	6.75	25.61	0.1	71.19	25.02	0.1	46.66	68.47	0.2	27.83	42.86	0.3	45.43	51
1.1	6.60	25.32	1.1	70.49	24.76	1.1	46.44	68.21	1.2	27.56	42.78	1.3	45.16	51
2.1	6.46	25.03	2.1	69.84	24.51	2.1	46.22	67.94	2.2	27.31	42.70	2.3	44.91	51
3.1	6.34	24.75	3.1	69.24	24.26	3.1	46.00	67.68	3.2	27.08	42.62	3.3	44.69	51
4.1	6.22	24.49	4.1	68.67	24.01	4.1	45.79	67.38	4.2	26.84	42.54	4.3	44.46	51
5.1	6.11	24.24	5.1	68.11	23.77	5.1	45.58	67.06	5.2	26.62	42.47	5.3	44.25	51
6.1	5.99	24.01	6.1	67.52	23.54	6.1	45.38	66.73	6.2	26.41	42.42	6.3	44.04	51
7.1	5.86	23.78	7.1	66.89	23.32	7.1	45.20	66.38	7.2	26.19	42.38	7.3	43.83	51
8.1	5.72	23.53	8.1	66.21	23.11	8.1	45.05	66.02	8.2	25.96	42.35	8.3	43.61	51
9.1	5.56	23.26	9.1	65.50	22.88	9.1	44.90	65.67	9.2	25.73	42.32	9.3	43.39	51
10.1	5.40	22.99	10.1	64.76	22.64	10.1	44.76	65.33	10.2	25.46	42.27	10.3	43.14	51
11.1	5.24	22.69	11.1	64.04	22.36	11.1	44.62	65.00	11.2	25.18	42.19	11.3	42.87	51
12.1	5.10	22.36	12.1	63.40	22.06	12.1	44.48	64.72	12.2	24.91	42.10	12.3	42.59	51
13.1	5.00	22.02	13.1	62.82	21.75	13.1	44.31	64.42	13.2	24.64	41.96	13.3	42.31	51
14.1	4.93	21.69	14.1	62.35	21.45	14.1	44.14	64.12	14.2	24.39	41.81	14.3	42.05	51
15.1	4.87	21.37	15.1	61.98	21.14	15.1	43.95	63.81	15.2	24.15	41.66	15.3	41.80	51
16.1	4.82	21.05	16.1	61.66	20.85	16.1	43.77	63.50	16.2	23.96	41.50	16.2	41.57	51
17.1	4.78	20.77	17.1	61.35	20.56	17.1	43.58	63.14	17.2	23.76	41.34	17.2	41.35	51
18.1	4.74	20.50	18.1	61.04	20.29	18.1	43.41	62.78	18.2	23.57	41.20	18.2	41.15	51
19.0	4.69	20.22	19.1	60.69	20.04	19.1	43.26	62.40	19.2	23.38	41.07	19.2	40.94	51
20.0	4.62	19.96	20.1	60.29	19.79	20.1	43.12	62.01	20.2	23.18	40.96	20.2	40.72	51
21.0	4.54	19.68	21.1	59.84	19.53	21.1	43.02	61.64	21.2	22.96	40.84	21.2	40.50	51
22.0	4.45	19.39	22.1	59.36	19.26	22.1	42.92	61.27	22.2	22.73	40.71	22.2	40.26	51
23.0	4.37	19.07	23.1	58.88	18.97	23.1	42.82	60.91	23.2	22.49	40.58	23.2	40.00	51
24.0	4.29	18.73	24.1	58.44	18.66	24.1	42.73	60.56	24.2	22.24	40.42	24.2	39.72	51
25.0	4.23	18.40	25.1	58.03	18.34	25.1	42.63	60.22	25.2	22.00	40.23	25.2	39.45	51
26.0	4.18	18.06	26.1	57.67	18.00	26.1	42.52	59.90	26.2	21.75	40.03	26.2	39.18	51
27.0	4.14	17.71	27.0	57.39	17.67	27.1	42.41	59.58	27.2	21.51	39.83	27.2	38.91	51
28.0	4.13	17.36	28.0	57.18	17.32	28.1	42.29	59.26	28.2	21.29	39.61	28.2	38.65	51
29.0	4.13	17.01	29.0	57.03	16.97	29.1	42.17	58.92	29.2	21.09	39.38	29.2	38.40	51
30.0	4.16	16.67	30.0	56.93	16.64	30.0	42.04	58.59	30.2	20.91	39.14	30.2	38.17	51
31.0	4.19	16.37	31.0	56.87	16.32	31.0	41.91	58.23	31.2	20.72	38.91	31.2	37.95	51
13.73 +13.69			50.82 +50.81			11.91 -11.87			12.32 +12.28			11.86 +11.8		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .1		
+85° 49' 4''.72			+88° 52' 2''.06			-85° 11' 3''.34			+85° 20' 19''.62			+85° 9' 32''		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 5 45	° ' " -84 50	Mar.	h m 6 46	° ' " -80 44	Mar.	h m 7 2	° ' " +87 11	Mar.	h m 7 14	° ' " +82 34	Mar.	h m 7 15	° ' " -86 54
	s	"		s	"		s	"		s	"		s	"
0.3	61.49	3.33	0.3	55.38	0.84	0.4	64.21	1.34	0.4	8.15	33.96	0.4	64.76	31.14
1.3	61.23	3.45	1.3	55.25	1.06	1.4	63.82	1.51	1.4	8.01	34.14	1.4	64.40	31.38
2.3	60.96	3.56	2.3	55.12	1.27	2.3	63.45	1.65	2.4	7.88	34.30	2.4	64.03	31.65
3.3	60.68	3.69	3.3	54.98	1.49	3.3	63.09	1.80	3.4	7.75	34.45	3.4	63.65	31.91
4.3	60.39	3.78	4.3	54.84	1.68	4.3	62.76	1.94	4.4	7.63	34.60	4.4	63.24	32.16
5.3	60.08	3.86	5.3	54.69	1.88	5.3	62.43	2.09	5.3	7.53	34.75	5.4	62.80	32.40
6.3	59.78	3.91	6.3	54.54	2.05	6.3	62.12	2.24	6.3	7.42	34.92	6.3	62.35	32.63
7.3	59.48	3.95	7.3	54.39	2.19	7.3	61.82	2.41	7.3	7.32	35.08	7.3	61.89	32.82
8.3	59.19	3.95	8.3	54.23	2.32	8.3	61.51	2.58	8.3	7.20	35.26	8.3	61.43	32.98
9.3	58.90	3.96	9.3	54.08	2.42	9.3	61.16	2.76	9.3	7.08	35.46	9.3	60.97	33.12
10.3	58.62	3.97	10.3	53.93	2.52	10.3	60.80	2.94	10.3	6.96	35.66	10.3	60.55	33.27
11.3	58.34	3.98	11.3	53.79	2.62	11.3	60.40	3.12	11.3	6.81	35.85	11.3	60.14	33.41
12.3	58.08	4.01	12.3	53.65	2.75	12.3	59.97	3.27	12.3	6.64	36.00	12.3	59.74	33.55
13.3	57.82	4.04	13.3	53.51	2.88	13.3	59.52	3.40	13.3	6.48	36.14	13.3	59.34	33.73
14.3	57.54	4.09	14.3	53.37	3.02	14.3	59.08	3.49	14.3	6.32	36.25	14.3	58.94	33.92
15.3	57.27	4.15	15.3	53.23	3.17	15.3	58.65	3.57	15.3	6.16	36.33	15.3	58.54	34.13
16.3	56.96	4.20	16.3	53.08	3.32	16.3	58.26	3.62	16.3	6.02	36.41	16.3	58.10	34.34
17.3	56.66	4.24	17.3	52.92	3.47	17.3	57.88	3.68	17.3	5.88	36.46	17.3	57.65	34.54
18.3	56.35	4.25	18.3	52.77	3.60	18.3	57.52	3.76	18.3	5.76	36.54	18.3	57.18	34.73
19.2	56.05	4.23	19.3	52.61	3.70	19.3	57.18	3.84	19.3	5.63	36.62	19.3	56.70	34.88
20.2	55.75	4.20	20.3	52.45	3.79	20.3	56.83	3.92	20.3	5.51	36.74	20.3	56.21	35.02
21.2	55.46	4.15	21.3	52.29	3.85	21.3	56.46	4.02	21.3	5.38	36.86	21.3	55.74	35.12
22.2	55.18	4.10	22.3	52.13	3.89	22.3	56.05	4.13	22.3	5.23	36.98	22.3	55.27	35.21
23.2	54.90	4.04	23.3	51.97	3.93	23.3	55.64	4.24	23.3	5.06	37.10	23.3	54.81	35.29
24.2	54.63	3.98	24.3	51.83	3.96	24.3	55.18	4.34	24.3	4.90	37.22	24.3	54.37	35.37
25.2	54.37	3.93	25.3	51.68	4.01	25.3	54.73	4.43	25.3	4.72	37.31	25.3	53.95	35.46
26.2	54.11	3.89	26.3	51.53	4.06	26.3	54.26	4.48	26.3	4.55	37.37	26.3	53.54	35.55
27.2	53.85	3.85	27.3	51.39	4.12	27.3	53.78	4.52	27.3	4.38	37.43	27.3	53.12	35.66
28.2	53.59	3.83	28.3	51.25	4.18	28.3	53.31	4.53	28.3	4.20	37.46	28.3	52.70	35.78
29.2	53.32	3.80	29.3	51.11	4.26	29.3	52.84	4.54	29.3	4.02	37.49	29.3	52.27	35.90
30.2	53.04	3.78	30.3	50.96	4.33	30.3	52.40	4.54	30.3	3.86	37.50	30.3	51.82	36.02
31.2	52.77	3.75	31.3	50.80	4.41	31.3	51.98	4.52	31.3	3.69	37.51	31.3	51.37	36.14
11.11 -11.06			6.21 -6.13			20.36 +20.33			7.74 +7.68			18.55 -18.52		
5 ^h 46 ^m 3 ^s .075			6 ^h 46 ^m 53 ^s .600			7 ^h 2 ^m 33 ^s .206			7 ^h 13 ^m 55 ^s .106			7 ^h 16 ^m 0 ^s .004		
-84° 49' 45".59			-80° 43' 42".15			+87° 10' 49".32			+82° 34' 23".73			-86° 54' 13".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamseleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 8 17	° ' +88 52	Mar.	h m 9 8	° ' -85 20	Mar.	h m 9 25	° ' +81 41	Mar.	h m 9 36	° ' -80 34	Mar.	h m 10 21	° ' +82 58
	s "	"		s "	"		s "	"		s "	"		s "	"
0.4	73.44	53.77	0.4	59.99	26.98	0.5	43.54	22.13	0.5	27.25	37.17	0.5	26.78	26.50
1.4	72.71	54.02	1.4	59.88	27.34	1.5	43.48	22.42	1.5	27.21	37.53	1.5	26.75	26.82
2.4	71.98	54.26	2.4	59.75	27.70	2.4	43.42	22.70	2.5	27.18	37.90	2.5	26.73	27.13
3.4	71.28	54.49	3.4	59.63	28.07	3.4	43.36	22.96	3.5	27.14	38.29	3.5	26.70	27.42
4.4	70.62	54.71	4.4	59.49	28.44	4.4	43.32	23.22	4.4	27.10	38.69	4.5	26.68	27.69
5.4	70.01	54.93	5.4	59.32	28.82	5.4	43.27	23.46	5.4	27.04	39.08	5.5	26.67	27.95
6.4	69.43	55.14	6.4	59.15	29.19	6.4	43.24	23.72	6.4	26.98	39.47	6.5	26.66	28.23
7.4	68.87	55.37	7.4	58.97	29.54	7.4	43.20	23.98	7.4	26.90	39.85	7.5	26.66	28.50
8.4	68.31	55.63	8.4	58.78	29.88	8.4	43.18	24.25	8.4	26.83	40.22	8.5	26.66	28.81
9.4	67.69	55.89	9.4	58.57	30.20	9.4	43.14	24.53	9.4	26.75	40.55	9.5	26.66	29.12
10.4	67.01	56.15	10.4	58.38	30.48	10.4	43.09	24.84	10.4	26.67	40.87	10.5	26.63	29.44
11.4	66.23	56.39	11.4	58.19	30.76	11.4	43.03	25.15	11.4	26.59	41.18	11.5	26.60	29.77
12.4	65.36	56.64	12.4	58.01	31.05	12.4	42.95	25.45	12.4	26.52	41.49	12.5	26.55	30.10
13.4	64.43	56.87	13.4	57.84	31.36	13.4	42.86	25.73	13.4	26.46	41.81	13.5	26.49	30.43
14.4	63.49	57.06	14.4	57.70	31.68	14.4	42.76	26.00	14.4	26.40	42.14	14.5	26.41	30.72
15.4	62.55	57.23	15.4	57.53	32.01	15.4	42.67	26.24	15.4	26.35	42.50	15.5	26.33	31.00
16.4	61.65	57.38	16.4	57.36	32.37	16.4	42.57	26.45	16.4	26.29	42.87	16.4	26.26	31.27
17.4	60.81	57.52	17.4	57.18	32.73	17.4	42.49	26.65	17.4	26.21	43.24	17.4	26.20	31.51
18.4	60.03	57.66	18.4	56.96	33.06	18.4	42.43	26.87	18.4	26.13	43.61	18.4	26.15	31.76
19.4	59.28	57.84	19.4	56.74	33.39	19.4	42.37	27.09	19.4	26.05	43.95	19.4	26.09	32.01
20.4	58.53	58.02	20.4	56.52	33.69	20.4	42.30	27.32	20.4	25.96	44.28	20.4	26.05	32.28
21.3	57.73	58.21	21.4	56.28	33.97	21.4	42.24	27.57	21.4	25.86	44.61	21.4	26.00	32.56
22.3	56.90	58.40	22.4	56.05	34.24	22.4	42.16	27.83	22.4	25.75	44.90	22.4	25.95	32.85
23.3	56.00	58.60	23.4	55.82	34.47	23.4	42.06	28.09	23.4	25.66	45.18	23.4	25.87	33.17
24.3	55.04	58.81	24.4	55.59	34.71	24.4	41.97	28.36	24.4	25.56	45.45	24.4	25.80	33.48
25.3	54.01	59.00	25.4	55.39	34.95	25.4	41.86	28.63	25.4	25.47	45.72	25.4	25.71	33.78
26.3	52.93	59.17	26.4	55.18	35.19	26.4	41.75	28.87	26.4	25.37	45.99	26.4	25.62	34.08
27.3	51.82	59.31	27.4	54.98	35.46	27.4	41.62	29.11	27.4	25.29	46.26	27.4	25.51	34.37
28.3	50.71	59.44	28.4	54.79	35.72	28.4	41.50	29.32	28.4	25.20	46.54	28.4	25.40	34.66
29.3	49.61	59.54	29.4	54.59	35.99	29.4	41.38	29.51	29.4	25.12	46.83	29.4	25.27	34.91
30.3	48.54	59.63	30.4	54.37	36.27	30.4	41.25	29.69	30.4	25.03	47.15	30.4	25.16	35.15
31.3	47.51	59.71	31.4	54.15	36.54	31.4	41.14	29.86	31.4	24.94	47.46	31.4	25.05	35.38
51.27 +51.26			12.31 -12.27			6.92 +6.85			6.11 -6.03			8.18 +8.12		
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
+88° 52' 49''.08			-85° 20' 12''.12			+81° 41' 25''.82			-80° 34' 23''.04			+82° 58' 35''.87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 11 0	° ' -84 9	Mar.	h m 12 15	° ' +88 8	Mar.	h m 12 46	° ' -84 40	Mar.	h m 12 48	° ' +83 51	Mar.	h m 13 27	° ' -85 21
	s "	"		s "	"		s "	"		s "	"		s "	"
0.5	6.95	18.52	0.6	4.92	57.34	0.6	27.48	42.55	0.6	41.06	9.29	0.6	39.71	58.18
1.5	6.98	18.90	1.6	5.15	57.65	1.6	27.63	42.86	1.6	41.15	9.57	1.6	39.93	58.46
2.5	7.01	19.30	2.6	5.33	57.95	2.6	27.78	43.21	2.6	41.24	9.85	2.6	40.15	58.77
3.5	7.03	19.71	3.6	5.51	58.24	3.6	27.94	43.57	3.6	41.32	10.12	3.6	40.38	59.09
4.5	7.04	20.13	4.6	5.70	58.53	4.6	28.09	43.94	4.6	41.42	10.38	4.6	40.60	59.41
5.5	7.05	20.55	5.6	5.89	58.81	5.6	28.23	44.32	5.6	41.51	10.63	5.6	40.82	59.76
6.5	7.04	20.99	6.6	6.12	59.05	6.6	28.37	44.72	6.6	41.61	10.87	6.6	41.02	60.12
7.5	7.01	21.41	7.6	6.38	59.31	7.6	28.47	45.14	7.6	41.71	11.10	7.6	41.20	60.49
8.5	6.98	21.82	8.5	6.66	59.58	8.6	28.57	45.53	8.6	41.83	11.36	8.6	41.37	60.86
9.5	6.94	22.21	9.5	6.93	59.87	9.6	28.65	45.91	9.6	41.94	11.62	9.6	41.51	61.23
10.5	6.89	22.59	10.5	7.18	60.18	10.6	28.73	46.28	10.6	42.04	11.89	10.6	41.65	61.57
11.5	6.85	22.95	11.5	7.39	60.50	11.6	28.80	46.64	11.6	42.14	12.20	11.6	41.79	61.91
12.5	6.81	23.31	12.5	7.55	60.85	12.6	28.88	46.97	12.6	42.23	12.53	12.6	41.93	62.23
13.5	6.80	23.67	13.5	7.65	61.21	13.6	28.97	47.31	13.6	42.28	12.87	13.6	42.09	62.53
14.5	6.79	24.04	14.5	7.70	61.54	14.6	29.09	47.67	14.6	42.33	13.20	14.6	42.26	62.84
15.5	6.77	24.44	15.5	7.71	61.86	15.6	29.21	48.02	15.6	42.37	13.52	15.6	42.45	63.17
16.5	6.76	24.85	16.5	7.71	62.15	16.5	29.33	48.40	16.6	42.40	13.81	16.6	42.64	63.51
17.5	6.74	25.26	17.5	7.71	62.44	17.5	29.43	48.81	17.5	42.44	14.10	17.6	42.83	63.89
18.5	6.70	25.68	18.5	7.75	62.72	18.5	29.54	49.22	18.5	42.48	14.36	18.6	43.00	64.27
19.5	6.65	26.09	19.5	7.83	62.99	19.5	29.63	49.64	19.5	42.54	14.63	19.6	43.15	64.66
20.5	6.57	26.49	20.5	7.92	63.26	20.5	29.68	50.06	20.5	42.59	14.90	20.6	43.28	65.04
21.5	6.50	26.88	21.5	8.02	63.57	21.5	29.74	50.44	21.5	42.66	15.19	21.6	43.38	65.43
22.5	6.42	27.25	22.5	8.12	63.89	22.5	29.77	50.83	22.5	42.73	15.50	22.6	43.48	65.80
23.5	6.33	27.60	23.5	8.18	64.22	23.5	29.80	51.21	23.5	42.78	15.81	23.6	43.57	66.16
24.5	6.25	27.94	24.5	8.23	64.58	24.5	29.83	51.57	24.5	42.82	16.15	24.6	43.66	66.52
25.4	6.17	28.27	25.5	8.23	64.93	25.5	29.86	51.91	25.5	42.86	16.50	25.6	43.75	66.85
26.4	6.11	28.60	26.5	8.19	65.29	26.5	29.90	52.25	26.5	42.87	16.86	26.6	43.84	67.18
27.4	6.05	28.93	27.5	8.10	65.64	27.5	29.95	52.60	27.5	42.88	17.21	27.5	43.95	67.51
28.4	5.98	29.26	28.5	7.98	65.98	28.5	30.00	52.96	28.5	42.88	17.55	28.5	44.05	67.84
29.4	5.92	29.62	29.5	7.84	66.32	29.5	30.05	53.32	29.5	42.87	17.89	29.5	44.18	68.18
30.4	5.87	29.99	30.5	7.67	66.65	30.5	30.11	53.69	30.5	42.84	18.22	30.5	44.30	68.53
31.4	5.79	30.37	31.5	7.50	66.94	31.5	30.17	54.07	31.5	42.83	18.54	31.5	44.42	68.90
9.82 -9.77			30.98 +30.97			10.79 -10.74			9.34 +9.29			12.38 -12.34		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
-84° 9' 9''.97			+88° 9' 16''.14			-84° 40' 41''.95			+83° 51' 30''.88			-85° 22' 0''.86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Mar.	14 13	-83 17	Mar.	15 3	+87 32	Mar.	15 24	-84 11	Mar.	16 54	+82 10	Mar.	17 16	-80 46
	s	"		s	"		s	"		s	"		s	"
0.7	48.01	32.03	0.7	23.35	31.32	0.7	20.52	32.36	0.8	15.20	4.16	0.8	10.40	55.44
1.7	48.18	32.26	1.7	23.79	31.48	1.7	20.77	32.49	1.8	15.36	4.16	1.8	10.57	55.38
2.6	48.37	32.50	2.7	24.21	31.65	2.7	21.01	32.62	2.8	15.52	4.17	2.8	10.73	55.32
3.6	48.56	32.75	3.7	24.62	31.80	3.7	21.28	32.76	3.8	15.67	4.20	3.8	10.91	55.28
4.6	48.75	33.01	4.7	25.02	31.95	4.7	21.54	32.94	4.8	15.82	4.21	4.8	11.09	55.24
5.6	48.94	33.30	5.7	25.41	32.09	5.7	21.81	33.11	5.8	15.97	4.21	5.8	11.28	55.24
6.6	49.12	33.62	6.7	25.83	32.21	6.7	22.08	33.33	6.7	16.12	4.20	6.8	11.47	55.26
7.6	49.30	33.95	7.7	26.25	32.33	7.7	22.32	33.55	7.7	16.27	4.17	7.8	11.66	55.29
8.6	49.45	34.27	8.7	26.70	32.46	8.7	22.56	33.78	8.7	16.44	4.15	8.8	11.84	55.34
9.6	49.59	34.59	9.7	27.15	32.59	9.7	22.78	34.02	9.7	16.60	4.12	9.8	12.01	55.40
10.6	49.73	34.90	10.7	27.62	32.73	10.7	22.98	34.25	10.7	16.77	4.12	10.8	12.18	55.46
11.6	49.86	35.20	11.7	28.08	32.91	11.7	23.18	34.44	11.7	16.94	4.14	11.7	12.32	55.50
12.6	49.99	35.46	12.7	28.52	33.13	12.7	23.38	34.64	12.7	17.11	4.18	12.7	12.46	55.52
13.6	50.13	35.73	13.7	28.94	33.36	13.7	23.59	34.82	13.7	17.28	4.26	13.7	12.61	55.52
14.6	50.29	36.00	14.6	29.32	33.59	14.7	23.81	35.00	14.7	17.44	4.36	14.7	12.78	55.52
15.6	50.46	36.28	15.6	29.66	33.81	15.7	24.06	35.17	15.7	17.59	4.46	15.7	12.95	55.52
16.6	50.62	36.58	16.6	29.97	34.04	16.7	24.30	35.39	16.7	17.73	4.56	16.7	13.14	55.52
17.6	50.79	36.89	17.6	30.29	34.25	17.7	24.55	35.59	17.7	17.88	4.66	17.7	13.32	55.56
18.6	50.96	37.22	18.6	30.60	34.45	18.7	24.80	35.84	18.7	18.02	4.75	18.7	13.51	55.61
19.6	51.11	37.58	19.6	30.93	34.64	19.7	25.04	36.10	19.7	18.16	4.83	19.7	13.70	55.68
20.6	51.25	37.94	20.6	31.28	34.82	20.6	25.26	36.37	20.7	18.30	4.88	20.7	13.88	55.77
21.6	51.37	38.30	21.6	31.65	35.01	21.6	25.45	36.65	21.7	18.47	4.94	21.7	14.05	55.88
22.6	51.48	38.64	22.6	32.04	35.22	22.6	25.64	36.93	22.7	18.63	5.01	22.7	14.22	55.99
23.6	51.57	38.96	23.6	32.43	35.44	23.6	25.81	37.18	23.7	18.79	5.09	23.7	14.36	56.10
24.6	51.67	39.28	24.6	32.81	35.68	24.6	26.00	37.42	24.7	18.95	5.19	24.7	14.50	56.19
25.6	51.77	39.57	25.6	33.18	35.94	25.6	26.17	37.67	25.7	19.11	5.31	25.7	14.65	56.23
26.6	51.88	39.88	26.6	33.51	36.22	26.6	26.35	37.89	26.7	19.26	5.45	26.7	14.79	56.36
27.6	51.99	40.18	27.6	33.84	36.50	27.6	26.52	38.12	27.7	19.41	5.61	27.7	14.93	56.41
28.6	52.09	40.48	28.6	34.13	36.79	28.6	26.70	38.35	28.7	19.57	5.78	28.7	15.07	56.48
29.6	52.22	40.78	29.6	34.40	37.08	29.6	26.90	38.58	29.7	19.71	5.96	29.7	15.24	56.54
30.6	52.35	41.10	30.6	34.64	37.37	30.6	27.10	38.81	30.7	19.85	6.14	30.7	15.40	56.62
31.6	52.48	41.42	31.6	34.86	37.65	31.6	27.31	39.07	31.7	19.98	6.33	31.7	15.57	56.70
8.56	-8.50		23.32	+23.30		9.88	-9.83		7.34	+7.27		6.24	-6.16	
14 ^h 13 ^m	37 ^s .066		15 ^h 3 ^m	21 ^s .809		15 ^h 24 ^m	9 ^s .966		16 ^h 54 ^m	19 ^s .238		17 ^h 16 ^m	6 ^s .064	
-83° 17'	37'''.78		+87° 32'	56'''.60		-84° 11'	42'''.92		+82° 10'	27'''.09		-80° 47'	10'''.43	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Mar.	17 58	+86 36	Mar.	18 6	−87 39	Mar.	19 0	+89 0	Mar.	19 29	−89 12	Mar.	20 48	+82 13
	s	"		s	"		s	"		s	"		s	"
0.8	23.96	32.72	0.8	54.00	34.19	0.9	5.71	54.68	0.9	1.73	63.66	0.9	25.71	40.73
1.8	24.32	32.64	1.8	54.59	34.05	1.8	6.82	54.52	1.9	3.10	63.40	1.9	25.80	40.44
2.8	24.67	32.58	2.8	55.18	33.90	2.8	7.89	54.35	2.9	4.55	63.14	2.9	25.90	40.20
3.8	25.01	32.52	3.8	55.82	33.75	3.8	8.93	54.21	3.9	6.07	62.88	3.9	25.99	39.96
4.8	25.33	32.44	4.8	56.49	33.62	4.8	9.92	54.08	4.9	7.70	62.62	4.9	26.07	39.72
5.8	25.65	32.36	5.8	57.18	33.52	5.8	10.86	53.94	5.9	9.43	62.38	5.9	26.16	39.47
6.8	25.97	32.28	6.8	57.88	33.43	6.8	11.78	53.78	6.9	11.23	62.15	6.9	26.23	39.21
7.8	26.28	32.18	7.8	58.58	33.38	7.8	12.71	53.61	7.9	13.05	61.96	7.9	26.29	38.95
8.8	26.61	32.07	8.8	59.25	33.34	8.8	13.67	53.44	8.8	14.85	61.77	8.9	26.39	38.69
9.8	26.97	31.95	9.8	59.91	33.31	9.8	14.71	53.26	9.8	16.60	61.60	9.9	26.48	38.40
10.8	27.34	31.85	10.8	60.51	33.28	10.8	15.84	53.08	10.8	18.26	61.43	10.9	26.57	38.11
11.8	27.71	31.77	11.8	61.11	33.24	11.8	17.03	52.92	11.8	19.82	61.26	11.9	26.66	37.84
12.8	28.11	31.72	12.8	61.68	33.19	12.8	18.30	52.78	12.8	21.33	61.07	12.9	26.79	37.57
13.8	28.50	31.71	13.8	62.27	33.12	13.8	19.58	52.68	13.8	22.82	60.88	13.9	26.91	37.33
14.8	28.89	31.72	14.8	62.87	33.03	14.8	20.84	52.59	14.8	24.36	60.67	14.9	27.04	37.12
15.8	29.25	31.75	15.8	63.51	32.93	15.8	22.05	52.53	15.8	25.97	60.44	15.9	27.17	36.92
16.8	29.59	31.78	16.8	64.18	32.83	16.8	23.19	52.47	16.8	27.70	60.22	16.9	27.29	36.74
17.8	29.92	31.79	17.8	64.88	32.77	17.8	24.27	52.41	17.8	29.53	60.02	17.9	27.41	36.56
18.8	30.25	31.79	18.8	65.59	32.73	18.8	25.31	52.36	18.8	31.43	59.83	18.9	27.52	36.37
19.8	30.57	31.78	19.8	66.29	32.71	19.8	26.37	52.27	19.8	33.38	59.66	19.9	27.63	36.18
20.8	30.90	31.76	20.8	67.00	32.72	20.8	27.44	52.18	20.8	35.31	59.52	20.9	27.74	35.97
21.8	31.26	31.74	21.8	67.66	32.73	21.8	28.56	52.08	21.8	37.19	59.38	21.9	27.84	35.75
22.7	31.63	31.72	22.8	68.28	32.77	22.8	29.75	51.98	22.8	39.00	59.27	22.9	27.97	35.52
23.7	32.01	31.71	23.8	68.90	32.80	23.8	31.00	51.88	23.8	40.73	59.17	23.9	28.09	35.29
24.7	32.40	31.71	24.7	69.49	32.81	24.8	32.30	51.80	24.8	42.39	59.06	24.9	28.21	35.07
25.7	32.79	31.75	25.7	70.06	32.81	25.8	33.65	51.73	25.8	44.02	58.94	25.9	28.36	34.87
26.7	33.19	31.79	26.7	70.63	32.82	26.8	35.01	51.68	26.8	45.61	58.83	26.9	28.50	34.67
27.7	33.57	31.86	27.7	71.21	32.82	27.8	36.37	51.66	27.8	47.22	58.70	27.9	28.65	34.49
28.7	33.96	31.95	28.7	71.80	32.80	28.8	37.72	51.65	28.8	48.85	58.56	28.9	28.81	34.34
29.7	34.34	32.06	29.7	72.41	32.78	29.8	39.03	51.66	29.8	50.53	58.43	29.8	28.96	34.19
30.7	34.68	32.16	30.7	73.04	32.77	30.8	40.29	51.68	30.8	52.29	58.29	30.8	29.11	34.07
31.7	35.01	32.26	31.7	73.70	32.76	31.8	41.49	51.70	31.8	54.13	58.14	31.8	29.25	33.96
16.91 +16.88			24.48 −24.46			58.15 +58.14			73.16 −73.15			7.39 +7.33		
17 ^h 58 ^m 41 ^s .809			18 ^h 6 ^m 47 ^s .620			19 ^h 1 ^m 27 ^s .463			19 ^h 29 ^m 16 ^s .746			20 ^h 48 ^m 36 ^s .323		
+86° 36' 51''.12			−87° 39' 51''.38			+89° 1' 7''.53			−89° 13' 21''.02			+82° 13' 43''.34		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 21 38	° ' -83 5	Mar.	h m 22 16	° ' -86 22	Mar.	h m 22 37	° ' -81 48	Mar.	h m 23 27	° ' +86 51	Mar.	h m 23 47	° ' -82 28
	s "			s "			s "			s "			s "	
0.9	23.86	38.64	0.9	7.56	58.69	1.0	39.83	35.22	1.0	20.94	32.95	1.1	12.84	24.87
1.9	23.92	38.28	1.9	7.60	58.29	1.9	39.83	34.85	2.0	20.91	32.62	2.0	12.79	24.51
2.9	23.98	37.90	2.9	7.65	57.89	2.9	39.84	34.45	3.0	20.88	32.31	3.0	12.73	24.13
3.9	24.06	37.52	3.9	7.72	57.49	3.9	39.87	34.04	4.0	20.87	32.02	4.0	12.69	23.74
4.9	24.15	37.14	4.9	7.81	57.08	4.9	39.90	33.62	5.0	20.84	31.73	5.0	12.65	23.33
5.9	24.25	36.75	5.9	7.93	56.67	5.9	39.93	33.20	6.0	20.80	31.44	6.0	12.63	22.91
6.9	24.37	36.37	6.9	8.07	56.27	6.9	39.98	32.80	7.0	20.75	31.17	7.0	12.62	22.49
7.9	24.50	36.01	7.9	8.23	55.88	7.9	40.04	32.40	8.0	20.69	30.87	8.0	12.62	22.08
8.9	24.63	35.66	8.9	8.41	55.49	8.9	40.10	32.01	9.0	20.61	30.56	9.0	12.62	21.68
9.9	24.74	35.33	9.9	8.57	55.15	9.9	40.16	31.64	10.0	20.54	30.24	10.0	12.63	21.30
10.9	24.85	35.02	10.9	8.73	54.81	10.9	40.21	31.28	11.0	20.48	29.89	11.0	12.64	20.92
11.9	24.96	34.71	11.9	8.86	54.47	11.9	40.26	30.93	12.0	20.46	29.53	12.0	12.63	20.57
12.9	25.06	34.40	12.9	8.98	54.12	12.9	40.31	30.59	13.0	20.48	29.17	13.0	12.61	20.23
13.9	25.15	34.05	13.9	9.08	53.75	13.9	40.35	30.24	14.0	20.51	28.83	14.0	12.58	19.87
14.9	25.23	33.70	14.9	9.17	53.38	14.9	40.38	29.87	14.9	20.59	28.51	15.0	12.55	19.49
15.9	25.32	33.35	15.9	9.29	53.00	15.9	40.41	29.46	15.9	20.68	28.21	16.0	12.53	19.10
16.9	25.43	32.98	16.9	9.42	52.61	16.9	40.43	29.06	16.9	20.77	27.92	17.0	12.52	18.69
17.9	25.56	32.61	17.9	9.58	52.21	17.9	40.49	28.66	17.9	20.85	27.64	18.0	12.52	18.27
18.9	25.69	32.24	18.9	9.77	51.82	18.9	40.57	28.25	18.9	20.91	27.37	19.0	12.53	17.84
19.9	25.84	31.89	19.9	9.98	51.43	19.9	40.65	27.86	19.9	20.95	27.09	19.9	12.56	17.42
20.9	26.00	31.56	20.9	10.20	51.07	20.9	40.74	27.48	20.9	20.99	26.82	20.9	12.59	17.01
21.9	26.15	31.27	21.9	10.43	50.73	21.9	40.82	27.12	21.9	21.01	26.51	21.9	12.63	16.62
22.9	26.29	30.98	22.9	10.64	50.41	22.9	40.91	26.78	22.9	21.04	26.17	22.9	12.67	16.23
23.9	26.43	30.69	23.9	10.84	50.08	23.9	40.99	26.45	23.9	21.10	25.83	23.9	12.70	15.86
24.9	26.55	30.42	24.9	11.04	49.75	24.9	41.06	26.13	24.9	21.18	25.49	24.9	12.73	15.51
25.9	26.68	30.16	25.9	11.23	49.44	25.9	41.13	25.81	25.9	21.28	25.15	25.9	12.75	15.17
26.9	26.80	29.88	26.9	11.40	49.13	26.9	41.19	25.49	26.9	21.40	24.82	26.9	12.76	14.83
27.9	26.92	29.59	27.9	11.56	48.81	27.9	41.25	25.16	27.9	21.54	24.49	27.9	12.77	14.47
28.9	27.04	29.29	28.9	11.73	48.49	28.9	41.31	24.83	28.9	21.71	24.18	28.9	12.78	14.11
29.9	27.16	28.99	29.9	11.91	48.15	29.9	41.38	24.47	29.9	21.88	23.88	29.9	12.80	13.73
30.9	27.29	28.68	30.9	12.10	47.80	30.9	41.46	24.10	30.9	22.07	23.60	30.9	12.82	13.34
31.9	27.43	28.35	31.9	12.31	47.44	31.9	41.54	23.74	31.9	22.25	23.34	31.9	12.85	12.94
8.32 -8.26			15.84 -15.81			7.02 -6.95			18.24 +18.22			7.63 -7.57		
21 ^h 38 ^m 29 ^s .050			22 ^h 16 ^m 20 ^s .949			22 ^h 37 ^m 45 ^s .323			23 ^h 27 ^m 43 ^s .851			23 ^h 47 ^m 20 ^s .032		
-83° 5' 50'' .66			-86° 23' 9'' .03			-81° 48' 43'' .57			+86° 51' 18'' .76			-82° 28' 28'' .42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 0 57	° ' +85 49	Apr.	h m 1 29	° ' +88 52	Apr.	h m 1 41	° ' -85 10	Apr.	h m 4 10	° ' +85 20	Apr.	h m 5 35	° ' +85 9
	s "	"		s "	"		s "	"		s "	"		s "	"
0.0	4.19	16.37	0.0	56.87	16.32	0.0	41.91	58.23	0.2	20.72	38.91	0.2	37.95	50.81
1.0	4.22	16.08	1.0	56.83	16.02	1.0	41.79	57.86	1.1	20.56	38.70	1.2	37.75	50.68
2.0	4.26	15.79	2.0	56.79	15.73	2.0	41.69	57.47	2.1	20.41	38.50	2.2	37.55	50.57
3.0	4.29	15.52	3.0	56.71	15.44	3.0	41.61	57.06	3.1	20.26	38.31	3.2	37.35	50.46
4.0	4.30	15.25	4.0	56.58	15.16	4.0	41.55	56.65	4.1	20.10	38.13	4.2	37.15	50.37
5.0	4.30	14.97	5.0	56.41	14.88	5.0	41.49	56.23	5.1	19.93	37.96	5.2	36.94	50.29
6.0	4.29	14.67	6.0	56.22	14.59	6.0	41.44	55.84	6.1	19.75	37.78	6.2	36.72	50.21
6.9	4.28	14.36	7.0	56.06	14.28	7.0	41.40	55.47	7.1	19.55	37.57	7.2	36.49	50.09
7.9	4.28	14.03	8.0	55.92	13.96	8.0	41.37	55.10	8.1	19.35	37.34	8.2	36.25	49.97
8.9	4.32	13.69	9.0	55.87	13.63	9.0	41.32	54.76	9.1	19.16	37.09	9.2	36.01	49.83
9.9	4.38	13.36	10.0	55.91	13.27	10.0	41.25	54.41	10.1	18.98	36.81	10.2	35.77	49.64
10.9	4.47	13.02	11.0	56.04	12.92	11.0	41.17	54.08	11.1	18.83	36.52	11.2	35.55	49.44
11.9	4.57	12.71	12.0	56.27	12.58	12.0	41.08	53.74	12.1	18.71	36.22	12.2	35.35	49.24
12.9	4.69	12.42	13.0	56.54	12.26	13.0	41.01	53.37	13.1	18.61	35.94	13.2	35.18	49.04
13.9	4.80	12.14	14.0	56.81	11.98	14.0	40.95	52.96	14.1	18.51	35.67	14.2	35.02	48.84
14.9	4.91	11.88	14.9	57.03	11.70	15.0	40.89	52.56	15.1	18.41	35.43	15.2	34.86	48.65
15.9	5.01	11.62	15.9	57.22	11.41	16.0	40.84	52.14	16.1	18.31	35.20	16.2	34.70	48.48
16.9	5.09	11.37	16.9	57.37	11.14	17.0	40.84	51.72	17.1	18.19	34.98	17.2	34.53	48.33
17.9	5.15	11.11	17.9	57.46	10.86	17.9	40.84	51.30	18.1	18.07	34.76	18.2	34.35	48.18
18.9	5.23	10.81	18.9	57.54	10.56	18.9	40.85	50.91	19.1	17.93	34.52	19.2	34.17	48.02
19.9	5.31	10.50	19.9	57.64	10.25	19.9	40.86	50.55	20.1	17.79	34.26	20.2	33.97	47.85
20.9	5.39	10.18	20.9	57.78	9.93	20.9	40.86	50.20	21.1	17.64	33.98	21.2	33.75	47.66
21.9	5.48	9.88	21.9	57.98	9.60	21.9	40.87	49.86	22.1	17.50	33.69	22.1	33.54	47.45
22.9	5.58	9.56	22.9	58.23	9.26	22.9	40.87	49.51	23.1	17.37	33.39	23.1	33.34	47.23
23.9	5.72	9.23	23.9	58.54	8.93	23.9	40.87	49.17	24.1	17.26	33.08	24.1	33.14	46.98
24.9	5.86	8.92	24.9	58.93	8.60	24.9	40.85	48.84	25.1	17.16	32.75	25.1	32.96	46.73
25.9	6.04	8.62	25.9	59.38	8.28	25.9	40.83	48.49	26.1	17.07	32.43	26.1	32.79	46.46
26.9	6.21	8.35	26.9	59.87	7.98	26.9	40.82	48.13	27.1	17.01	32.12	27.1	32.64	46.19
27.9	6.39	8.10	27.9	60.38	7.69	27.9	40.81	47.76	28.1	16.97	31.82	28.1	32.50	45.94
28.9	6.58	7.86	28.9	60.89	7.42	28.9	40.81	47.37	29.1	16.93	31.53	29.1	32.38	45.69
29.9	6.76	7.62	29.9	61.37	7.16	29.9	40.82	46.97	30.1	16.89	31.25	30.1	32.27	45.45
30.9	6.92	7.39	30.9	61.83	6.91	30.9	40.85	46.57	31.1	16.86	30.98	31.1	32.16	45.23
13.72 +13.68			50.70 +50.69			11.90 -11.86			12.32 +12.28			11.86 +11.82		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .554		
+85° 49' 4".72			+88° 52' 2".06			-85° 11' 3".34			+85° 20' 19".62			+85° 9' 32".39		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			5 Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	De- nat.
Apr.	h m 5 45	° ' -84 49	Apr.	h m 6 46	° ' -80 44	Apr.	h m 7 2	° ' +87 11	Apr.	h m 7 13	° ' +82 34	Apr.	h m 7 15	-86
	s "	"		s "	"		s "	"		s "	"		s "	
0.2	52.77	63.75	0.3	50.80	4.41	0.3	51.98	4.52	0.3	63.69	37.51	0.3	51.37	36
1.2	52.47	63.70	1.3	50.64	4.46	1.3	51.58	4.51	1.3	63.55	37.51	1.3	50.90	36
2.2	52.18	63.62	2.3	50.49	4.51	2.3	51.20	4.49	2.3	63.42	37.52	2.3	50.40	36
3.2	51.89	63.54	3.2	50.32	4.52	3.3	50.84	4.48	3.3	63.28	37.53	3.3	49.90	36
4.2	51.60	63.42	4.2	50.16	4.52	4.3	50.48	4.48	4.3	63.15	37.56	4.3	49.40	36
5.2	51.32	63.30	5.2	49.99	4.48	5.3	50.08	4.51	5.3	63.02	37.59	5.3	48.89	36
6.2	51.05	63.16	6.2	49.84	4.44	6.3	49.68	4.54	6.3	62.87	37.62	6.3	48.42	36
7.2	50.81	63.03	7.2	49.69	4.40	7.2	49.26	4.55	7.3	62.70	37.66	7.3	47.96	36
8.2	50.56	62.90	8.2	49.55	4.36	8.2	48.80	4.55	8.3	62.53	37.68	8.3	47.53	36
9.2	50.30	62.80	9.2	49.41	4.35	9.2	48.33	4.51	9.3	62.35	37.66	9.3	47.10	36
10.2	50.06	62.71	10.2	49.27	4.34	10.2	47.85	4.44	10.2	62.17	37.63	10.3	46.68	36
11.2	49.80	62.63	11.2	49.12	4.36	11.2	47.39	4.35	11.2	62.00	37.56	11.2	46.24	36
12.2	49.54	62.55	12.2	48.98	4.38	12.2	46.98	4.26	12.2	61.84	37.48	12.2	45.79	36
13.2	49.26	62.46	13.2	48.83	4.39	13.2	46.58	4.15	13.2	61.70	37.39	13.2	45.33	36
14.2	48.98	62.34	14.2	48.66	4.39	14.2	46.21	4.04	14.2	61.56	37.30	14.2	44.84	36
15.2	48.71	62.20	15.2	48.50	4.36	15.2	45.87	3.95	15.2	61.43	37.21	15.2	44.34	36
16.2	48.44	62.03	16.2	48.34	4.31	16.2	45.52	3.87	16.2	61.31	37.15	16.2	43.84	36
17.2	48.17	61.86	17.2	48.19	4.23	17.2	45.16	3.82	17.2	61.18	37.09	17.2	43.35	36
18.2	47.93	61.67	18.2	48.05	4.13	18.2	44.79	3.76	18.2	61.04	37.04	18.2	42.87	36
19.2	47.69	61.49	19.2	47.89	4.03	19.2	44.39	3.71	19.2	60.90	37.01	19.2	42.41	36
20.2	47.46	61.30	20.2	47.74	3.93	20.2	43.97	3.64	20.2	60.74	36.99	20.2	41.96	36
21.2	47.23	61.12	21.2	47.61	3.82	21.2	43.54	3.56	21.2	60.57	36.94	21.2	41.53	36
22.2	47.01	60.96	22.2	47.48	3.72	22.2	43.10	3.47	22.2	60.40	36.86	22.2	41.12	36
23.2	46.80	60.80	23.2	47.34	3.64	23.2	42.65	3.34	23.2	60.22	36.77	23.2	40.71	36
24.2	46.58	60.64	24.2	47.21	3.56	24.2	42.22	3.21	24.2	60.05	36.65	24.2	40.30	36
25.1	46.36	60.47	25.2	47.08	3.49	25.2	41.80	3.05	25.2	59.89	36.53	25.2	39.90	36
26.1	46.13	60.32	26.2	46.94	3.43	26.2	41.38	2.88	26.2	59.74	36.39	26.2	39.49	36
27.1	45.90	60.17	27.2	46.81	3.36	27.2	41.01	2.71	27.2	59.60	36.25	27.2	39.05	36
28.1	45.67	60.01	28.2	46.66	3.28	28.2	40.67	2.54	28.2	59.46	36.09	28.2	38.60	36
29.1	45.42	59.83	29.2	46.53	3.19	29.2	40.33	2.36	29.2	59.35	35.93	29.2	38.14	36
30.1	45.18	59.61	30.2	46.38	3.07	30.2	40.02	2.20	30.2	59.23	35.79	30.2	37.66	36
31.1	44.96	59.38	31.2	46.24	2.93	31.2	39.72	2.05	31.2	59.11	35.65	31.2	37.19	36
11.11 -11.06			6.21 -6.13			20.36 +20.33			7.74 +7.68			18.55 -18.55		
5 ^h 46 ^m 3 ^s .075			6 ^h 46 ^m 53 ^s .600			7 ^h 2 ^m 33 ^s .206			7 ^h 13 ^m 55 ^s .106			7 ^h 16 ^m 0 ^s .0		
-84° 49' 45".59			-80° 43' 42".15			+87° 10' 49".32			+82° 34' 23".73			-86° 54' 13".		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleonis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "
Apr.	8 17	+88 52	Apr.	9 8	-85 20	Apr.	9 25	+81 41	Apr.	9 36	-80 34	Apr.	10 21	+82 58
0.3	47.51	59.71	0.4	54.15	36.54	0.4	41.14	29.86	0.4	24.94	47.46	0.4	25.05	35.38
1.3	46.52	59.79	1.4	53.92	36.82	1.4	41.03	30.02	1.4	24.85	47.77	1.4	24.95	35.59
2.3	45.60	59.87	2.4	53.68	37.09	2.4	40.93	30.18	2.4	24.75	48.06	2.4	24.84	35.79
3.3	44.71	59.96	3.3	53.41	37.33	3.4	40.84	30.35	3.4	24.65	48.35	3.4	24.76	36.01
4.3	43.83	60.05	4.3	53.14	37.58	4.4	40.74	30.52	4.4	24.53	48.62	4.4	24.68	36.24
5.3	42.93	60.16	5.3	52.86	37.79	5.4	40.65	30.71	5.4	24.40	48.86	5.4	24.59	36.49
6.3	41.97	60.27	6.3	52.59	37.98	6.4	40.56	30.90	6.4	24.27	49.09	6.4	24.50	36.73
7.3	40.93	60.39	7.3	52.32	38.16	7.4	40.43	31.10	7.4	24.16	49.30	7.4	24.39	36.99
8.3	39.86	60.50	8.3	52.08	38.35	8.3	40.31	31.30	8.4	24.05	49.50	8.4	24.26	37.24
9.3	38.69	60.58	9.3	51.84	38.53	9.3	40.16	31.48	9.4	23.94	49.72	9.4	24.13	37.48
10.3	37.49	60.63	10.3	51.61	38.74	10.3	40.02	31.62	10.3	23.84	49.95	10.4	23.99	37.70
11.3	36.31	60.67	11.3	51.39	38.96	11.3	39.88	31.75	11.3	23.75	50.19	11.4	23.84	37.90
12.3	35.17	60.66	12.3	51.15	39.19	12.3	39.73	31.85	12.3	23.64	50.46	12.4	23.69	38.08
13.3	34.09	60.65	13.3	50.92	39.43	13.3	39.60	31.95	13.3	23.54	50.73	13.4	23.55	38.24
14.3	33.09	60.64	14.3	50.65	39.67	14.3	39.50	32.03	14.3	23.44	51.00	14.4	23.41	38.38
15.3	32.14	60.64	15.3	50.38	39.90	15.3	39.38	32.12	15.3	23.31	51.25	15.4	23.30	38.54
16.3	31.21	60.64	16.3	50.09	40.09	16.3	39.27	32.22	16.3	23.18	51.48	16.4	23.19	38.71
17.3	30.28	60.65	17.3	49.80	40.24	17.3	39.16	32.33	17.3	23.06	51.67	17.4	23.06	38.88
18.3	29.31	60.69	18.3	49.51	40.39	18.3	39.04	32.45	18.3	22.93	51.86	18.4	22.94	39.05
19.3	28.29	60.74	19.3	49.23	40.54	19.3	38.91	32.59	19.3	22.80	52.03	19.4	22.82	39.24
20.3	27.20	60.80	20.3	48.94	40.67	20.3	38.79	32.73	20.3	22.67	52.18	20.4	22.69	39.43
21.3	26.08	60.84	21.3	48.67	40.77	21.3	38.65	32.86	21.3	22.54	52.32	21.4	22.55	39.63
22.3	24.91	60.85	22.3	48.43	40.88	22.3	38.51	32.98	22.3	22.42	52.47	22.3	22.38	39.83
23.3	23.70	60.82	23.3	48.18	41.01	23.3	38.35	33.08	23.3	22.32	52.62	23.3	22.22	40.02
24.3	22.50	60.79	24.3	47.93	41.14	24.3	38.20	33.17	24.3	22.20	52.79	24.3	22.05	40.19
25.3	21.32	60.75	25.3	47.69	41.27	25.3	38.04	33.23	25.3	22.09	52.95	25.3	21.87	40.33
26.2	20.15	60.69	26.3	47.43	41.41	26.3	37.89	33.27	26.3	21.98	53.12	26.3	21.70	40.44
27.2	19.05	60.61	27.3	47.17	41.57	27.3	37.74	33.31	27.3	21.86	53.29	27.3	21.54	40.55
28.2	18.00	60.53	28.3	46.91	41.72	28.3	37.59	33.32	28.3	21.74	53.47	28.3	21.39	40.64
29.2	17.02	60.45	29.3	46.63	41.87	29.3	37.47	33.33	29.3	21.61	53.65	29.3	21.24	40.73
30.2	16.08	60.36	30.3	46.34	42.01	30.3	37.35	33.34	30.3	21.48	53.82	30.3	21.10	40.81
31.2	15.19	60.28	31.3	46.04	42.11	31.3	37.24	33.37	31.3	21.35	53.96	31.3	20.97	40.89
51.32 +51.31			12.32 -12.28			6.92 +6.85			6.11 -6.03			8.18 +8.12		
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
+88° 52' 49".08			-85° 20' 12".12			+81° 41' 25".82			-80° 34' 23".04			+82° 58' 35".87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			82 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 11 0	° ' " -84 9	Apr.	h m 12 14	° ' " +88 9	Apr.	h m 12 46	° ' " -84 40	Apr.	h m 12 48	° ' " +83 51	Apr.	h m 13 27	° ' " -85 22
0.4	s 5.79	30.37	0.5	s 67.50	6.94	0.5	s 30.17	54.07	0.5	s 42.83	18.54	0.5	s 44.42	8.90
1.4	5.72	30.75	1.5	67.35	7.23	1.5	30.22	54.47	1.5	42.82	18.83	1.5	44.53	9.28
2.4	5.63	31.13	2.5	67.22	7.50	2.5	30.26	54.88	2.5	42.82	19.12	2.5	44.63	9.69
3.4	5.53	31.53	3.5	67.12	7.76	3.5	30.29	55.30	3.5	42.81	19.39	3.5	44.72	10.11
4.4	5.41	31.90	4.5	67.03	8.04	4.5	30.29	55.72	4.5	42.82	19.66	4.5	44.79	10.51
5.4	5.29	32.24	5.5	66.95	8.32	5.5	30.28	56.12	5.5	42.82	19.95	5.5	44.83	10.92
6.4	5.15	32.56	6.5	66.87	8.63	6.5	30.25	56.50	6.5	42.83	20.26	6.5	44.87	11.29
7.4	5.02	32.87	7.5	66.75	8.95	7.5	30.23	56.87	7.5	42.83	20.58	7.5	44.90	11.67
8.4	4.90	33.16	8.5	66.58	9.28	8.5	30.22	57.21	8.5	42.81	20.92	8.5	44.93	12.01
9.4	4.80	33.46	9.5	66.36	9.62	9.5	30.21	57.55	9.5	42.77	21.28	9.5	44.97	12.35
10.4	4.71	33.77	10.5	66.08	9.96	10.5	30.22	57.89	10.5	42.73	21.62	10.5	45.02	12.68
11.4	4.62	34.10	11.5	65.75	10.26	11.5	30.25	58.25	11.5	42.67	21.96	11.5	45.11	13.03
12.4	4.53	34.43	12.5	65.42	10.54	12.5	30.27	58.61	12.5	42.59	22.27	12.5	45.20	13.39
13.4	4.44	34.79	13.4	65.08	10.81	13.5	30.30	58.99	13.5	42.51	22.56	13.5	45.28	13.77
14.4	4.33	35.16	14.4	64.76	11.07	14.5	30.30	59.39	14.5	42.46	22.84	14.5	45.35	14.18
15.4	4.20	35.50	15.4	64.48	11.31	15.5	30.30	59.80	15.5	42.40	23.11	15.5	45.40	14.59
16.4	4.06	35.84	16.4	64.23	11.56	16.5	30.27	60.21	16.5	42.35	23.37	16.5	45.43	14.99
17.4	3.91	36.16	17.4	63.99	11.82	17.5	30.23	60.60	17.5	42.31	23.64	17.5	45.43	15.39
18.4	3.76	36.45	18.4	63.76	12.09	18.5	30.17	60.98	18.5	42.28	23.93	18.5	45.43	15.77
19.4	3.60	36.74	19.4	63.50	12.38	19.5	30.11	61.34	19.5	42.23	24.24	19.5	45.41	16.15
20.4	3.45	36.98	20.4	63.23	12.66	20.5	30.04	61.68	20.5	42.18	24.55	20.5	45.38	16.49
21.4	3.30	37.23	21.4	62.92	12.96	21.4	29.98	62.00	21.5	42.11	24.86	21.5	45.36	16.83
22.4	3.15	37.48	22.4	62.57	13.25	22.4	29.92	62.32	22.4	42.03	25.17	22.5	45.35	17.16
23.4	3.01	37.73	23.4	62.17	13.55	23.4	29.87	62.64	23.4	41.95	25.50	23.5	45.34	17.49
24.4	2.89	38.00	24.4	61.75	13.83	24.4	29.82	62.96	24.4	41.85	25.83	24.5	45.34	17.81
25.4	2.76	38.26	25.4	61.29	14.10	25.4	29.79	63.28	25.4	41.74	26.15	25.5	45.34	18.14
26.4	2.63	38.52	26.4	60.83	14.36	26.4	29.75	63.61	26.4	41.63	26.43	26.5	45.35	18.48
27.4	2.50	38.80	27.4	60.36	14.60	27.4	29.71	63.97	27.4	41.52	26.71	27.5	45.36	18.83
28.4	2.36	39.09	28.4	59.89	14.83	28.4	29.68	64.32	28.4	41.41	26.97	28.5	45.37	19.19
29.4	2.21	39.38	29.4	59.45	15.03	29.4	29.64	64.68	29.4	41.31	27.21	29.5	45.38	19.57
30.4	2.05	39.66	30.4	59.03	15.22	30.4	29.57	65.05	30.4	41.21	27.44	30.5	45.35	19.96
31.3	1.88	39.93	31.4	58.64	15.41	31.4	29.49	65.42	31.4	41.11	27.67	31.5	45.32	20.36
9.83 -9.78			31.03 +31.01			10.79 -10.75			9.34 +9.29			12.39 -12.35		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
-84° 9' 9''.97			+88° 9' 16''.14			-84° 40' 41''.95			+83° 51' 30''.88			-85° 22' 0''.86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 14 13	° ' −83 17	Apr.	h m 15 3	° ' +87 32	Apr.	h m 15 24	° ' −84 11	Apr.	h m 16 54	° ' +82 10	Apr.	h m 17 16	° ' −80 46
	s "	"		s "	"		s "	"		s "	"		s "	"
0.6	52.48	41.42	0.6	34.86	37.65	0.6	27.31	39.07	0.7	19.98	6.33	0.7	15.57	56.70
1.6	52.60	41.78	1.6	35.07	37.92	1.6	27.51	39.33	1.7	20.11	6.52	1.7	15.74	56.80
2.6	52.72	42.15	2.6	35.29	38.16	2.6	27.72	39.62	2.7	20.24	6.69	2.7	15.92	56.93
3.6	52.82	42.53	3.6	35.52	38.41	3.6	27.92	39.94	3.7	20.36	6.84	3.7	16.10	57.07
4.6	52.92	42.92	4.6	35.76	38.65	4.6	28.10	40.26	4.7	20.49	6.99	4.7	16.27	57.25
5.6	53.00	43.30	5.6	36.03	38.88	5.6	28.27	40.59	5.7	20.62	7.14	5.7	16.42	57.42
6.6	53.06	43.67	6.6	36.30	39.13	6.6	28.41	40.91	6.7	20.76	7.28	6.7	16.58	57.59
7.5	53.12	44.01	7.6	36.57	39.41	7.6	28.55	41.20	7.7	20.90	7.46	7.7	16.70	57.74
8.5	53.19	44.34	8.6	36.82	39.71	8.6	28.69	41.48	8.7	21.04	7.65	8.7	16.84	57.89
9.5	53.26	44.65	9.6	37.03	40.04	9.6	28.84	41.76	9.7	21.18	7.88	9.7	16.97	58.03
10.5	53.34	44.95	10.6	37.22	40.37	10.6	28.99	42.02	10.7	21.31	8.12	10.7	17.11	58.15
11.5	53.44	45.27	11.6	37.36	40.71	11.6	29.16	42.28	11.6	21.41	8.39	11.7	17.26	58.26
12.5	53.53	45.60	12.6	37.47	41.04	12.6	29.33	42.55	12.6	21.52	8.65	12.7	17.43	58.38
13.5	53.64	45.96	13.6	37.56	41.35	13.6	29.51	42.83	13.6	21.63	8.90	13.7	17.58	58.51
14.5	53.74	46.33	14.6	37.64	41.64	14.6	29.69	43.15	14.6	21.73	9.14	14.7	17.76	58.66
15.5	53.82	46.72	15.6	37.74	41.93	15.6	29.87	43.48	15.6	21.84	9.37	15.7	17.92	58.84
16.5	53.90	47.10	16.6	37.86	42.19	16.6	30.02	43.84	16.6	21.94	9.58	16.7	18.09	59.03
17.5	53.95	47.49	17.6	37.99	42.46	17.6	30.16	44.18	17.6	22.04	9.78	17.6	18.23	59.25
18.5	53.99	47.87	18.6	38.15	42.74	18.6	30.29	44.51	18.6	22.15	9.96	18.6	18.37	59.47
19.5	54.02	48.24	19.6	38.31	43.04	19.6	30.39	44.85	19.6	22.26	10.19	19.6	18.50	59.67
20.5	54.05	48.57	20.5	38.46	43.36	20.6	30.49	45.17	20.6	22.38	10.42	20.6	18.62	59.87
21.5	54.07	48.91	21.5	38.61	43.68	21.6	30.58	45.49	21.6	22.50	10.67	21.6	18.74	60.07
22.5	54.10	49.24	22.5	38.71	44.02	22.6	30.69	45.78	22.6	22.60	10.96	22.6	18.84	60.25
23.5	54.14	49.56	23.5	38.80	44.36	23.6	30.79	46.07	23.6	22.70	11.25	23.6	18.96	60.42
24.5	54.18	49.87	24.5	38.86	44.72	24.6	30.90	46.34	24.6	22.81	11.56	24.6	19.08	60.59
25.5	54.22	50.18	25.5	38.90	45.07	25.5	31.01	46.62	25.6	22.90	11.86	25.6	19.20	60.74
26.5	54.26	50.50	26.5	38.90	45.41	26.5	31.13	46.91	26.6	22.99	12.17	26.6	19.33	60.91
27.5	54.31	50.86	27.5	38.88	45.74	27.5	31.26	47.22	27.6	23.06	12.48	27.6	19.47	61.09
28.5	54.36	51.21	28.5	38.85	46.07	28.5	31.38	47.52	28.6	23.14	12.78	28.6	19.61	61.28
29.5	54.41	51.59	29.5	38.82	46.38	29.5	31.51	47.85	29.6	23.20	13.06	29.6	19.75	61.49
30.5	54.46	51.97	30.5	38.80	46.66	30.5	31.63	48.21	30.6	23.26	13.34	30.6	19.90	61.72
31.5	54.48	52.35	31.5	38.79	46.94	31.5	31.73	48.57	31.6	23.34	13.60	31.6	20.03	61.98
8.57 −8.51 23.35 +23.32 9.89 −9.84 7.34 +7.27 6.24 −6.16			14 ^h 13 ^m 37 ^s .066 15 ^h 3 ^m 21 ^s .809 15 ^h 24 ^m 9 ^s .966 16 ^h 54 ^m 19 ^s .238 17 ^h 16 ^m 6 ^s .064			−83° 17' 37''.78 +87° 32' 56''.60 −84° 11' 42''.92 +82° 10' 27''.09 −80° 47' 10''.43								

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Apr.	17 58	+86 36	Apr.	18 7	−87 39	Apr.	19 0	+89 0	Apr.	19 29	−89 12	Apr.	20 48	+82 13
	s	"		s	"		s	"		s	"		s	"
0.7	35.01	32.26	0.7	13.70	32.76	0.8	41.49	51.70	0.8	54.13	58.14	0.8	29.25	33.96
1.7	35.33	32.36	1.7	14.39	32.79	1.8	42.63	51.71	1.8	56.06	58.00	1.8	29.40	33.85
2.7	35.65	32.46	2.7	15.09	32.82	2.8	43.74	51.72	2.8	58.05	57.90	2.8	29.54	33.74
3.7	35.97	32.54	3.7	15.78	32.89	3.8	44.81	51.73	3.8	60.07	57.81	3.8	29.68	33.61
4.7	36.29	32.60	4.7	16.45	32.98	4.8	45.91	51.73	4.8	62.09	57.75	4.8	29.80	33.49
5.7	36.62	32.65	5.7	17.11	33.07	5.8	47.06	51.72	5.8	64.06	57.70	5.8	29.93	33.35
6.7	36.97	32.72	6.7	17.72	33.18	6.8	48.27	51.71	6.8	65.93	57.65	6.8	30.07	33.20
7.7	37.33	32.81	7.7	18.30	33.27	7.7	49.55	51.70	7.8	67.71	57.62	7.8	30.23	33.05
8.7	37.69	32.94	8.7	18.86	33.35	8.7	50.88	51.72	8.8	69.40	57.57	8.8	30.38	32.92
9.7	38.05	33.07	9.7	19.41	33.42	9.7	52.23	51.76	9.8	71.06	57.49	9.8	30.55	32.82
10.7	38.41	33.25	10.7	19.98	33.47	10.7	53.56	51.85	10.8	72.72	57.42	10.8	30.72	32.75
11.7	38.74	33.43	11.7	20.58	33.51	11.7	54.84	51.93	11.8	74.44	57.34	11.8	30.89	32.70
12.7	39.04	33.63	12.7	21.21	33.55	12.7	56.05	52.03	12.8	76.26	57.25	12.8	31.06	32.67
13.7	39.33	33.82	13.7	21.85	33.60	13.7	57.18	52.15	13.8	78.17	57.15	13.8	31.23	32.65
14.7	39.61	33.99	14.7	22.51	33.69	14.7	58.24	52.25	14.7	80.16	57.09	14.8	31.38	32.62
15.7	39.88	34.14	15.7	23.18	33.79	15.7	59.27	52.34	15.7	82.20	57.04	15.8	31.52	32.59
16.7	40.16	34.29	16.7	23.85	33.91	16.7	60.30	52.43	16.7	84.22	57.02	16.8	31.67	32.54
17.7	40.45	34.43	17.7	24.48	34.06	17.7	61.38	52.49	17.7	86.20	57.02	17.8	31.81	32.49
18.7	40.76	34.57	18.7	25.07	34.21	18.7	62.50	52.55	18.7	88.10	57.03	18.8	31.96	32.42
19.7	41.07	34.72	19.7	25.63	34.36	19.7	63.69	52.61	19.7	89.91	57.06	19.8	32.11	32.36
20.7	41.39	34.89	20.7	26.16	34.50	20.7	64.90	52.69	20.7	91.65	57.08	20.8	32.28	32.29
21.7	41.71	35.07	21.7	26.68	34.64	21.7	66.16	52.79	21.7	93.33	57.09	21.8	32.45	32.23
22.7	42.04	35.27	22.7	27.18	34.77	22.7	67.42	52.90	22.7	94.94	57.11	22.8	32.62	32.19
23.7	42.36	35.49	23.7	27.69	34.89	23.7	68.69	53.03	23.7	96.56	57.12	23.8	32.79	32.18
24.7	42.66	35.72	24.7	28.19	35.00	24.7	69.93	53.17	24.7	98.18	57.12	24.8	32.96	32.18
25.7	42.95	35.96	25.7	28.73	35.11	25.7	71.13	53.35	25.7	99.83	57.10	25.8	33.14	32.21
26.7	43.22	36.23	26.7	29.27	35.21	26.7	72.27	53.54	26.7	101.54	57.09	26.8	33.32	32.24
27.7	43.46	36.47	27.7	29.83	35.33	27.7	73.35	53.73	27.7	103.33	57.08	27.8	33.49	32.29
28.6	43.70	36.72	28.7	30.41	35.47	28.7	74.35	53.91	28.7	105.17	57.08	28.8	33.64	32.34
29.6	43.93	36.96	29.7	31.01	35.62	29.7	75.30	54.09	29.7	107.08	57.11	29.8	33.79	32.40
30.6	44.14	37.20	30.6	31.61	35.79	30.7	76.20	54.25	30.7	109.04	57.15	30.8	33.95	32.46
31.6	44.36	37.41	31.6	32.19	35.97	31.7	77.11	54.40	31.7	110.98	57.20	31.8	34.10	32.50
16.91 +16.88			24.49 −24.47			58.14 +58.14			73.07 −73.06			7.39 +7.32		
17 ^h 58 ^m 41 ^s .809			18 ^h 6 ^m 47 ^s .620			19 ^h 1 ^m 27 ^s .463			19 ^h 29 ^m 16 ^s .746			20 ^h 48 ^m 36 ^s .323		
+86° 36' 51".12			−87° 39' 51".38			+89° 1' 7".53			−89° 13' 21".02			+82° 13' 43".34		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ ¹ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Apr.	21 38	-83 5	Apr.	22 16	-86 22	Apr.	22 37	-81 48	Apr.	23 27	+86 51	Apr.	23 47	-82 28
	s	"		s	"		s	"		s	"		s	"
0.9	27.43	28.35	0.9	12.31	47.44	0.9	41.54	23.74	0.9	22.25	23.34	0.9	12.85	12.94
1.9	27.60	28.02	1.9	12.54	47.10	1.9	41.63	23.38	1.9	22.42	23.08	1.9	12.89	12.53
2.9	27.77	27.72	2.9	12.81	46.76	2.9	41.73	23.01	2.9	22.58	22.83	2.9	12.93	12.11
3.9	27.95	27.43	3.9	13.08	46.42	3.9	41.84	22.65	3.9	22.72	22.57	3.9	12.99	11.70
4.9	28.14	27.16	4.9	13.36	46.10	4.9	41.97	22.31	4.9	22.86	22.30	4.9	13.06	11.31
5.9	28.31	26.91	5.9	13.66	45.81	5.9	42.09	21.98	5.9	22.99	22.02	5.9	13.14	10.93
6.9	28.48	26.67	6.9	13.94	45.53	6.9	42.20	21.67	6.9	23.13	21.74	6.9	13.22	10.56
7.9	28.64	26.44	7.9	14.20	45.26	7.9	42.30	21.38	7.9	23.29	21.45	7.9	13.28	10.21
8.9	28.79	26.20	8.9	14.45	45.00	8.9	42.40	21.09	8.9	23.48	21.15	8.9	13.34	9.88
9.9	28.93	25.96	9.9	14.68	44.72	9.9	42.48	20.80	9.9	23.71	20.85	9.9	13.40	9.55
10.8	29.07	25.70	10.9	14.89	44.42	10.9	42.57	20.49	10.9	23.97	20.57	10.9	13.43	9.19
11.8	29.22	25.44	11.9	15.11	44.10	11.9	42.66	20.17	11.9	24.24	20.32	11.9	13.47	8.82
12.8	29.39	25.16	12.9	15.35	43.77	12.9	42.76	19.83	12.9	24.53	20.08	12.9	13.52	8.45
13.8	29.56	24.88	13.9	15.61	43.45	13.9	42.87	19.48	13.9	24.80	19.87	13.9	13.58	8.06
14.8	29.74	24.60	14.9	15.90	43.13	14.9	42.99	19.13	14.9	25.06	19.66	14.9	13.65	7.66
15.8	29.92	24.33	15.9	16.21	42.83	15.9	43.12	18.79	15.9	25.30	19.45	15.9	13.73	7.27
16.8	30.11	24.08	16.9	16.53	42.55	16.9	43.26	18.48	16.9	25.52	19.24	16.9	13.83	6.88
17.8	30.32	23.87	17.9	16.86	42.28	17.9	43.39	18.19	17.9	25.73	19.03	17.9	13.93	6.51
18.8	30.52	23.68	18.9	17.19	42.04	18.9	43.52	17.91	18.9	25.94	18.81	18.9	14.03	6.17
19.8	30.71	23.50	19.9	17.50	41.80	19.9	43.66	17.64	19.9	26.17	18.55	19.9	14.13	5.83
20.8	30.89	23.32	20.8	17.80	41.58	20.9	43.78	17.39	20.9	26.41	18.29	20.9	14.23	5.51
21.8	31.06	23.15	21.8	18.09	41.36	21.9	43.90	17.15	21.9	26.68	18.03	21.9	14.32	5.21
22.8	31.22	22.98	22.8	18.37	41.13	22.9	44.02	16.91	22.9	26.97	17.78	22.9	14.40	4.91
23.8	31.37	22.81	23.8	18.64	40.90	23.9	44.12	16.65	23.9	27.28	17.54	23.9	14.48	4.61
24.8	31.52	22.62	24.8	18.90	40.67	24.9	44.23	16.40	24.9	27.60	17.31	24.9	14.55	4.29
25.8	31.69	22.42	25.8	19.17	40.44	25.8	44.34	16.14	25.9	27.94	17.11	25.9	14.63	3.97
26.8	31.87	22.22	26.8	19.44	40.20	26.8	44.46	15.87	26.9	28.29	16.91	26.9	14.71	3.65
27.8	32.05	22.01	27.8	19.74	39.95	27.8	44.58	15.58	27.9	28.64	16.73	27.9	14.80	3.32
28.8	32.24	21.80	28.8	20.05	39.70	28.8	44.71	15.30	28.9	28.98	16.58	28.9	14.89	2.97
29.8	32.44	21.60	29.8	20.38	39.45	29.8	44.86	15.01	29.9	29.29	16.43	29.9	15.00	2.61
30.8	32.65	21.41	30.8	20.74	39.21	30.8	45.01	14.74	30.9	29.59	16.29	30.9	15.12	2.26
31.8	32.87	21.25	31.8	21.11	39.00	31.8	45.17	14.49	31.9	29.88	16.15	31.9	15.25	1.92
8.31 -8.25			15.83 -15.80			7.02 -6.94			18.23 +18.20			7.63 -7.56		
21 ^h 38 ^m 29 ^s .050			22 ^h 16 ^m 20 ^s .949			22 ^h 37 ^m 45 ^s .323			23 ^h 27 ^m 43 ^s .851			23 ^h 47 ^m 20 ^s .032		
-83° 5' 50''.66			-86° 23' 9''.03			-81° 48' 43''.57			+86° 51' 18''.76			-82° 28' 28''.42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
May	0 57	+85 49	May	1 30	+88 51	May	1 41	-85 10	May	4 10	+85 20	May	5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.9	6.92	7.39	0.9	1.83	66.91	0.9	40.85	46.57	1.1	16.86	30.98	1.1	32.16	45.23
1.9	7.06	7.17	1.9	2.24	66.66	1.9	40.90	46.16	2.1	16.81	30.71	2.1	32.04	45.02
2.9	7.20	6.94	2.9	2.61	66.41	2.9	40.97	45.76	3.1	16.75	30.45	3.1	31.92	44.81
3.9	7.34	6.70	3.9	2.97	66.14	3.9	41.04	45.38	4.1	16.68	30.19	4.1	31.78	44.59
4.9	7.49	6.43	4.9	3.36	65.86	4.9	41.11	45.04	5.1	16.61	29.91	5.1	31.63	44.37
5.9	7.65	6.17	5.9	3.80	65.57	5.9	41.18	44.71	6.1	16.54	29.60	6.1	31.48	44.11
6.9	7.83	5.90	6.9	4.33	65.27	6.9	41.23	44.39	7.0	16.48	29.28	7.1	31.33	43.83
7.9	8.05	5.65	7.9	4.95	64.97	7.9	41.27	44.07	8.0	16.44	28.95	8.1	31.19	43.53
8.9	8.28	5.40	8.9	5.67	64.68	8.9	41.30	43.74	9.0	16.42	28.59	9.1	31.08	43.21
9.9	8.52	5.17	9.9	6.45	64.41	9.9	41.32	43.40	10.0	16.44	28.25	10.1	30.99	42.90
10.9	8.77	4.97	10.9	7.24	64.17	10.9	41.36	43.04	11.0	16.47	27.93	11.1	30.93	42.59
11.9	9.02	4.78	11.9	8.00	63.95	11.9	41.41	42.66	12.0	16.50	27.63	12.1	30.88	42.30
12.9	9.26	4.61	12.9	8.73	63.75	12.9	41.47	42.27	13.0	16.54	27.35	13.1	30.82	42.03
13.9	9.47	4.44	13.9	9.39	63.56	13.9	41.56	41.88	14.0	16.57	27.09	14.1	30.76	41.78
14.9	9.67	4.27	14.9	10.00	63.34	14.9	41.66	41.51	15.0	16.58	26.83	15.1	30.69	41.53
15.9	9.87	4.09	15.9	10.60	63.12	15.9	41.78	41.15	16.0	16.59	26.56	16.1	30.61	41.29
16.9	10.06	3.91	16.9	11.17	62.90	16.9	41.90	40.81	17.0	16.58	26.29	17.1	30.53	41.04
17.9	10.25	3.70	17.9	11.79	62.66	17.9	42.01	40.47	18.0	16.57	25.98	18.1	30.43	40.77
18.9	10.47	3.48	18.9	12.45	62.39	18.9	42.12	40.16	19.0	16.55	25.67	19.1	30.33	40.47
19.9	10.70	3.28	19.9	13.15	62.12	19.9	42.23	39.87	20.0	16.55	25.35	20.1	30.24	40.16
20.9	10.93	3.07	20.9	13.92	61.87	20.9	42.34	39.58	21.0	16.56	25.03	21.1	30.16	39.85
21.9	11.20	2.86	21.9	14.75	61.63	21.9	42.44	39.29	22.0	16.59	24.68	22.1	30.09	39.53
22.9	11.47	2.67	22.9	15.64	61.39	22.9	42.53	39.00	23.0	16.64	24.34	23.1	30.04	39.20
23.9	11.76	2.49	23.9	16.57	61.18	23.9	42.62	38.70	24.0	16.71	24.01	24.1	29.99	38.86
24.9	12.04	2.34	24.9	17.51	60.98	24.9	42.71	38.39	25.0	16.79	23.69	25.1	29.96	38.53
25.9	12.33	2.21	25.9	18.46	60.80	25.9	42.81	38.06	25.9	16.88	23.38	26.1	29.95	38.22
26.9	12.61	2.10	26.9	19.41	60.63	26.9	42.93	37.73	26.9	16.98	23.10	27.1	29.95	37.92
27.9	12.89	1.99	27.9	20.30	60.48	27.9	43.06	37.39	27.9	17.08	22.84	28.0	29.97	37.63
28.9	13.15	1.89	28.9	21.16	60.34	28.9	43.20	37.04	28.9	17.18	22.58	29.0	29.98	37.37
29.9	13.39	1.79	29.9	21.96	60.21	29.9	43.37	36.71	29.9	17.26	22.32	30.0	29.98	37.10
30.9	13.63	1.66	30.9	22.74	60.06	30.9	43.54	36.40	30.9	17.32	22.06	31.0	29.96	36.83
31.8	13.86	1.54	31.9	23.51	59.89	31.9	43.71	36.11	31.9	17.38	21.80	32.0	29.93	36.55
13.71 +13.68			50.60 +50.59			11.90 -11.86			12.31 +12.27			11.86 +11.81		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .554		
+85° 49' 4".72			+88° 52' 2".06			-85° 11' 3".34			+85° 20' 19".62			+85° 9' 32".39		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			5 Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m ° ' "			h m ° ' "			h m ° ' "			h m ° ' "			h m ° ' "	
May	5 45	-84 49	May	6 46	-80 43	May	7 2	+87 10	May	7 13	+82 34	May	7 15	-86 54
	s	"		s	"		s	"		s	"		s	"
1.1	44.96	59.38	1.2	46.24	62.93	1.2	39.72	62.05	1.2	59.11	35.65	1.2	37.19	36.30
2.1	44.73	59.14	2.2	46.09	62.76	2.2	39.42	61.91	2.2	59.01	35.53	2.2	36.72	36.18
3.1	44.51	58.88	3.2	45.95	62.59	3.2	39.11	61.77	3.2	58.89	35.43	3.2	36.27	36.06
4.1	44.32	58.62	4.2	45.82	62.41	4.2	38.75	61.65	4.2	58.76	35.31	4.2	35.85	35.94
5.1	44.12	58.38	5.2	45.70	62.23	5.2	38.39	61.51	5.2	58.62	35.18	5.2	35.44	35.81
6.1	43.94	58.16	6.2	45.58	62.06	6.2	38.01	61.34	6.2	58.48	35.05	6.2	35.06	35.70
7.1	43.76	57.97	7.2	45.46	61.92	7.2	37.63	61.14	7.2	58.32	34.87	7.2	34.68	35.60
8.1	43.57	57.77	8.2	45.34	61.80	8.2	37.26	60.92	8.2	58.18	34.68	8.2	34.31	35.53
9.1	43.38	57.58	9.2	45.22	61.70	9.2	36.92	60.68	9.2	58.05	34.45	9.2	33.94	35.48
10.1	43.19	57.38	10.1	45.10	61.58	10.2	36.62	60.43	10.2	57.93	34.22	10.2	33.51	35.40
11.1	42.98	57.17	11.1	44.97	61.46	11.2	36.34	60.18	11.2	57.83	34.00	11.2	33.10	35.32
12.1	42.78	56.93	12.1	44.84	61.30	12.2	36.10	59.94	12.2	57.75	33.78	12.2	32.65	35.23
13.1	42.57	56.66	13.1	44.71	61.12	13.2	35.87	59.72	13.2	57.67	33.58	13.2	32.21	35.10
14.1	42.37	56.38	14.1	44.58	60.93	14.1	35.64	59.52	14.2	57.58	33.39	14.2	31.78	34.96
15.1	42.18	56.10	15.1	44.45	60.71	15.1	35.40	59.32	15.2	57.49	33.21	15.2	31.36	34.78
16.1	42.01	55.81	16.1	44.33	60.48	16.1	35.13	59.13	16.2	57.39	33.05	16.2	30.95	34.60
17.1	41.86	55.52	17.1	44.23	60.26	17.1	34.85	58.94	17.1	57.27	32.87	17.2	30.58	34.43
18.1	41.72	55.23	18.1	44.13	60.03	18.1	34.54	58.73	18.1	57.15	32.69	18.1	30.22	34.25
19.1	41.58	54.97	19.1	44.02	59.80	19.1	34.24	58.51	19.1	57.03	32.49	19.1	29.88	34.07
20.1	41.44	54.71	20.1	43.92	59.59	20.1	33.93	58.27	20.1	56.91	32.27	20.1	29.55	33.89
21.1	41.30	54.47	21.1	43.82	59.38	21.1	33.62	58.01	21.1	56.79	32.04	21.1	29.22	33.74
22.1	41.16	54.22	22.1	43.73	59.19	22.1	33.34	57.74	22.1	56.69	31.77	22.1	28.90	33.59
23.1	41.03	53.97	23.1	43.63	59.00	23.1	33.08	57.45	23.1	56.59	31.52	23.1	28.57	33.46
24.1	40.88	53.73	24.1	43.53	58.82	24.1	32.84	57.16	24.1	56.49	31.26	24.1	28.24	33.32
25.1	40.73	53.47	25.1	43.43	58.63	25.1	32.63	56.87	25.1	56.41	30.98	25.1	27.88	33.17
26.1	40.59	53.20	26.1	43.33	58.42	26.1	32.45	56.58	26.1	56.35	30.70	26.1	27.53	33.02
27.1	40.44	52.92	27.1	43.23	58.20	27.1	32.30	56.29	27.1	56.29	30.43	27.1	27.16	32.86
28.1	40.29	52.62	28.1	43.12	57.98	28.1	32.15	56.02	28.1	56.24	30.18	28.1	26.79	32.67
29.1	40.14	52.30	29.1	43.02	57.71	29.1	32.02	55.79	29.1	56.18	29.96	29.1	26.42	32.45
30.1	40.01	51.97	30.1	42.93	57.42	30.1	31.86	55.55	30.1	56.13	29.74	30.1	26.06	32.21
31.0	39.92	51.63	31.1	42.83	57.12	31.1	31.69	55.31	31.1	56.06	29.52	31.1	25.73	31.96
32.0	39.82	51.28	32.1	42.75	56.84	32.1	31.51	55.07	32.1	55.98	29.30	32.1	25.42	31.71
11.10 -11.06			6.21 -6.13			20.35 +20.32			7.74 +7.67			18.55 -18.52		
5 ^h 46 ^m 3 ^s .075			6 ^h 46 ^m 53 ^s .600			7 ^h 2 ^m 33 ^s .206			7 ^h 13 ^m 55 ^s .106			7 ^h 16 ^m 0 ^s .004		
-84° 49' 45".59			-80° 43' 42".15			+87° 10' 49".32			+82° 34' 23".73			-86° 54' 13".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaleontis. Mag. 5.2			80 H. Camelopardalis. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m s	° ' "	May	h m s	° ' "	May	h m s	° ' "	May	h m s	° ' "	May	h m s	° ' "
	8 16	+88 52		9 8	-85 20		9 25	+81 41		9 36	-80 34		10 21	+82 35
1.2	75.19	60.28	1.3	46.04	42.11	1.3	37.24	33.37	1.3	21.35	53.96	1.3	20.97	40.12
2.2	74.30	60.23	2.3	45.73	42.21	2.3	37.13	33.40	2.3	21.21	54.07	2.3	20.84	40.12
3.2	73.38	60.18	3.3	45.43	42.27	3.3	37.00	33.44	3.3	21.07	54.18	3.3	20.70	40.12
4.2	72.39	60.13	4.3	45.14	42.31	4.3	36.87	33.49	4.3	20.93	54.27	4.3	20.56	40.12
5.2	71.35	60.08	5.3	44.85	42.35	5.3	36.73	33.54	5.3	20.79	54.35	5.3	20.40	40.12
6.2	70.23	60.01	6.3	44.58	42.40	6.3	36.59	33.58	6.3	20.66	54.43	6.3	20.23	40.12
7.2	69.10	59.91	7.3	44.34	42.46	7.3	36.41	33.59	7.3	20.56	54.51	7.3	20.05	40.12
8.2	67.95	59.77	8.3	44.09	42.54	8.3	36.27	33.58	8.3	20.44	54.61	8.3	19.87	40.12
9.2	66.86	59.61	9.2	43.84	42.62	9.3	36.12	33.55	9.3	20.33	54.71	9.3	19.68	40.12
10.2	65.84	59.44	10.2	43.58	42.72	10.3	35.97	33.49	10.3	20.20	54.85	10.3	19.49	40.12
11.2	64.95	59.27	11.2	43.31	42.81	11.3	35.84	33.41	11.3	20.08	54.98	11.3	19.34	40.12
12.2	64.03	59.10	12.2	43.02	42.89	12.3	35.71	33.34	12.3	19.95	55.10	12.3	19.19	40.12
13.2	63.21	58.96	13.2	42.73	42.95	13.3	35.60	33.28	13.3	19.81	55.20	13.3	19.05	40.12
14.2	62.42	58.82	14.2	42.43	43.00	14.2	35.49	33.23	14.3	19.67	55.28	14.3	18.90	40.12
15.2	61.60	58.69	15.2	42.13	43.02	15.2	35.38	33.19	15.3	19.54	55.33	15.3	18.77	40.12
16.2	60.75	58.57	16.2	41.83	43.01	16.2	35.25	33.17	16.2	19.40	55.37	16.3	18.63	40.12
17.2	59.84	58.45	17.2	41.54	42.98	17.2	35.13	33.16	17.2	19.26	55.38	17.3	18.46	40.12
18.2	58.89	58.33	18.2	41.26	42.95	18.2	34.99	33.13	18.2	19.12	55.39	18.3	18.30	40.12
19.2	57.91	58.20	19.2	40.99	42.92	19.2	34.85	33.09	19.2	18.99	55.39	19.3	18.13	40.12
20.2	56.90	58.03	20.2	40.75	42.89	20.2	34.70	33.05	20.2	18.86	55.38	20.3	17.96	40.12
21.2	55.88	57.87	21.2	40.50	42.88	21.2	34.55	32.98	21.2	18.75	55.38	21.3	17.77	40.12
22.2	54.89	57.69	22.2	40.26	42.88	22.2	34.40	32.89	22.2	18.64	55.41	22.3	17.58	40.12
23.2	53.92	57.47	23.2	40.01	42.88	23.2	34.25	32.80	23.2	18.52	55.44	23.3	17.40	40.12
24.2	53.02	57.25	24.2	39.76	42.88	24.2	34.12	32.70	24.2	18.41	55.47	24.3	17.22	40.12
25.2	52.17	57.02	25.2	39.51	42.89	25.2	33.99	32.56	25.2	18.28	55.51	25.3	17.05	40.12
26.2	51.40	56.79	26.2	39.24	42.89	26.2	33.87	32.42	26.2	18.16	55.54	26.3	16.88	40.12
27.2	50.69	56.56	27.2	38.97	42.88	27.2	33.76	32.29	27.2	18.03	55.55	27.3	16.74	40.12
28.2	50.04	56.34	28.2	38.68	42.85	28.2	33.66	32.15	28.2	17.90	55.57	28.2	16.60	40.12
29.2	49.41	56.14	29.2	38.39	42.79	29.2	33.56	32.03	29.2	17.76	55.57	29.2	16.47	40.12
30.2	48.77	55.94	30.2	38.10	42.72	30.2	33.46	31.92	30.2	17.63	55.53	30.2	16.33	40.12
31.2	48.10	55.75	31.2	37.82	42.63	31.2	33.36	31.81	31.2	17.48	55.46	31.2	16.20	40.12
32.2	47.36	55.57	32.2	37.54	42.52	32.2	33.24	31.71	32.2	17.35	55.38	32.2	16.05	40.12
51.30 +51.29			12.32 -12.28			6.92 +6.85			6.11 -6.03			8.18 +8.1		
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .3		
+88° 52' 49".08			-85° 20' 12".12			+81° 41' 25".82			-80° 34' 23".04			+82° 58' 35".		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 10 59	° ' -84 9	May	h m 12 14	° ' +88 9	May	h m 12 46	° ' -84 41	May	h m 12 48	° ' +83 51	May	h m 13 27	° ' -85 22
	s "	"		s "	"		s "	"		s "	"		s "	"
1.3	61.88	39.93	1.4	58.64	15.41	1.4	29.49	5.42	1.4	41.11	27.67	1.5	45.32	20.36
2.3	61.70	40.17	2.4	58.26	15.63	2.4	29.39	5.79	2.4	41.02	27.90	2.4	45.26	20.74
3.3	61.51	40.40	3.4	57.88	15.84	3.4	29.29	6.12	3.4	40.94	28.15	3.4	45.18	21.10
4.3	61.31	40.62	4.4	57.48	16.07	4.4	29.16	6.44	4.4	40.86	28.41	4.4	45.10	21.43
5.3	61.14	40.81	5.4	57.07	16.30	5.4	29.06	6.74	5.4	40.75	28.68	5.4	45.02	21.77
6.3	60.96	41.00	6.4	56.59	16.56	6.4	28.96	7.02	6.4	40.63	28.97	6.4	44.96	22.07
7.3	60.81	41.20	7.4	56.05	16.80	7.4	28.87	7.30	7.4	40.50	29.24	7.4	44.90	22.38
8.3	60.66	41.42	8.4	55.47	17.02	8.4	28.80	7.61	8.4	40.34	29.51	8.4	44.85	22.68
9.3	60.52	41.64	9.4	54.87	17.21	9.4	28.74	7.91	9.4	40.19	29.75	9.4	44.83	23.00
10.3	60.38	41.87	10.4	54.26	17.38	10.4	28.68	8.22	10.4	40.03	29.97	10.4	44.80	23.34
11.3	60.21	42.11	11.4	53.67	17.53	11.4	28.60	8.57	11.4	39.88	30.17	11.4	44.77	23.70
12.3	60.05	42.35	12.4	53.11	17.68	12.4	28.51	8.90	12.4	39.74	30.36	12.4	44.73	24.06
13.3	59.86	42.58	13.4	52.60	17.82	13.4	28.41	9.24	13.4	39.61	30.54	13.4	44.65	24.42
14.3	59.67	42.78	14.4	52.12	17.94	14.4	28.28	9.57	14.4	39.48	30.71	14.4	44.57	24.76
15.3	59.47	42.96	15.4	51.64	18.10	15.4	28.15	9.88	15.4	39.37	30.90	15.4	44.45	25.10
16.3	59.26	43.11	16.4	51.17	18.27	16.4	28.00	10.16	16.4	39.24	31.10	16.4	44.33	25.43
17.3	59.06	43.26	17.4	50.67	18.45	17.4	27.85	10.43	17.4	39.11	31.31	17.4	44.20	25.74
18.3	58.85	43.39	18.4	50.14	18.63	18.4	27.71	10.67	18.4	38.98	31.53	18.4	44.07	26.02
19.3	58.67	43.52	19.4	49.58	18.80	19.4	27.57	10.92	19.4	38.83	31.76	19.4	43.95	26.30
20.3	58.48	43.64	20.3	48.99	18.97	20.4	27.43	11.15	20.4	38.67	31.98	20.4	43.83	26.56
21.3	58.31	43.76	21.3	48.36	19.14	21.4	27.30	11.38	21.4	38.50	32.21	21.4	43.73	26.82
22.3	58.14	43.90	22.3	47.72	19.29	22.4	27.17	11.62	22.4	38.33	32.41	22.4	43.63	27.09
23.3	57.97	44.04	23.3	47.04	19.43	23.4	27.07	11.86	23.4	38.15	32.61	23.4	43.54	27.36
24.3	57.80	44.19	24.3	46.36	19.54	24.4	26.95	12.13	24.4	37.97	32.79	24.4	43.44	27.64
25.3	57.63	44.36	25.3	45.70	19.64	25.4	26.83	12.39	25.4	37.78	32.93	25.4	43.35	27.93
26.3	57.45	44.51	26.3	45.05	19.73	26.4	26.71	12.66	26.4	37.61	33.07	26.4	43.25	28.24
27.3	57.26	44.66	27.3	44.44	19.81	27.4	26.58	12.93	27.4	37.44	33.20	27.4	43.13	28.55
28.3	57.06	44.79	28.3	43.86	19.86	28.3	26.42	13.21	28.4	37.28	33.30	28.4	43.00	28.86
29.3	56.84	44.90	29.3	43.30	19.92	29.3	26.25	13.48	29.3	37.13	33.42	29.4	42.86	29.17
30.3	56.61	45.00	30.3	42.76	20.00	30.3	26.08	13.72	30.3	36.99	33.54	30.4	42.69	29.45
31.3	56.39	45.08	31.3	42.22	20.07	31.3	25.90	13.96	31.3	36.85	33.67	31.4	42.51	29.73
32.3	56.19	45.15	32.3	41.65	20.16	32.3	25.71	14.15	32.3	36.68	33.82	32.4	42.34	29.98
9.83 -9.78			31.06 +31.04			10.80 -10.75			9.35 +9.29			12.40 -12.36		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
-84° 9' 9''.97			+88° 9' 16''.14			-84° 40' 41''.95			+83° 51' 30''.88			-85° 22' 0''.86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	De nat.
May	h m 14 13	° ' " -83 17	May	h m 15 3	° ' " +87 32	May	h m 15 24	° ' " -84 11	May	h m 16 54	° ' " +82 10	May	h m 17 16	-80
	s "			s "			s "			s "			s "	
1.5	54.48	52.35	1.5	38.79	46.94	1.5	31.73	48.57	1.6	23.34	13.60	1.6	20.03	1
2.5	54.49	52.74	2.5	38.79	47.21	2.5	31.82	48.94	2.6	23.41	13.86	2.6	20.16	2
3.5	54.49	53.11	3.5	38.83	47.48	3.5	31.90	49.31	3.6	23.49	14.11	3.6	20.28	2
4.5	54.47	53.47	4.5	38.84	47.80	4.5	31.95	49.66	4.6	23.57	14.37	4.6	20.38	2
5.5	54.46	53.80	5.5	38.85	48.12	5.5	32.00	49.98	5.6	23.65	14.67	5.6	20.47	3
6.5	54.45	54.11	6.5	38.83	48.45	6.5	32.06	50.28	6.6	23.72	14.98	6.6	20.56	3
7.5	54.44	54.42	7.5	38.78	48.81	7.5	32.14	50.57	7.6	23.78	15.32	7.6	20.65	3
8.5	54.45	54.73	8.5	38.69	49.17	8.5	32.21	50.86	8.6	23.84	15.68	8.6	20.76	3
9.5	54.48	55.04	9.5	38.55	49.50	9.5	32.29	51.16	9.6	23.88	16.03	9.6	20.88	3
10.5	54.51	55.36	10.5	38.38	49.84	10.5	32.38	51.47	10.6	23.92	16.39	10.6	21.00	4
11.5	54.52	55.72	11.5	38.21	50.16	11.5	32.48	51.80	11.6	23.96	16.72	11.6	21.12	4
12.5	54.53	56.08	12.5	38.06	50.44	12.5	32.57	52.15	12.6	23.99	17.02	12.6	21.26	4
13.5	54.54	56.45	13.5	37.92	50.71	13.5	32.65	52.51	13.6	24.02	17.31	13.6	21.38	4
14.4	54.51	56.82	14.5	37.80	50.98	14.5	32.70	52.89	14.6	24.05	17.59	14.6	21.49	5
15.4	54.48	57.19	15.5	37.69	51.26	15.5	32.75	53.26	15.6	24.09	17.86	15.6	21.59	5
16.4	54.44	57.54	16.5	37.60	51.53	16.5	32.77	53.61	16.6	24.13	18.14	16.6	21.69	5
17.4	54.40	57.86	17.5	37.50	51.84	17.5	32.78	53.94	17.6	24.18	18.45	17.6	21.76	5
18.4	54.34	58.17	18.5	37.39	52.14	18.5	32.79	54.27	18.5	24.22	18.77	18.6	21.83	6
19.4	54.29	58.45	19.5	37.26	52.46	19.5	32.81	54.59	19.5	24.26	19.10	19.6	21.89	6
20.4	54.25	58.73	20.5	37.10	52.79	20.5	32.81	54.88	20.5	24.30	19.46	20.6	21.95	6
21.4	54.21	59.02	21.5	36.93	53.12	21.5	32.82	55.17	21.5	24.32	19.82	21.6	22.03	6
22.4	54.17	59.31	22.5	36.72	53.45	22.5	32.85	55.44	22.5	24.34	20.18	22.6	22.10	7
23.4	54.14	59.59	23.5	36.49	53.77	23.5	32.87	55.73	23.5	24.35	20.54	23.5	22.18	7
24.4	54.12	59.88	24.5	36.24	54.09	24.5	32.91	56.04	24.5	24.36	20.90	24.5	22.27	7
25.4	54.10	60.18	25.5	35.97	54.38	25.5	32.95	56.35	25.5	24.36	21.26	25.5	22.36	7
26.4	54.07	60.49	26.4	35.69	54.65	26.5	32.99	56.68	26.5	24.35	21.60	26.5	22.45	8
27.4	54.04	60.81	27.4	35.41	54.90	27.5	33.02	57.02	27.5	24.35	21.92	27.5	22.54	8
28.4	54.00	61.14	28.4	35.17	55.14	28.5	33.03	57.38	28.5	24.34	22.23	28.5	22.63	8
29.4	53.92	61.48	29.4	34.93	55.37	29.5	33.03	57.74	29.5	24.34	22.51	29.5	22.71	9
30.4	53.85	61.80	30.4	34.70	55.60	30.5	33.01	58.09	30.5	24.33	22.79	30.5	22.78	9
31.4	53.77	62.10	31.4	34.48	55.84	31.5	32.98	58.43	31.5	24.34	23.08	31.5	22.83	9
32.4	53.68	62.38	32.4	34.27	56.11	32.4	32.94	58.75	32.5	24.34	23.40	32.5	22.87	10
8.57 -8.51			23.37 +23.35			9.89 -9.84			7.34 +7.27			6.24 -6.16		
14 ^h 13 ^m 37 ^s .066			15 ^h 3 ^m 21 ^s .809			15 ^h 24 ^m 9 ^s .966			16 ^h 54 ^m 19 ^s .238			17 ^h 16 ^m 6 ^s .0		
-83° 17' 37".78			+87° 32' 56".60			-84° 11' 42".92			+82° 10' 27".09			-80° 47' 10".4		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
May	17 58	+86 36	May	18 7	-87 39	May	19 1	+89 0	May	19 30	-89 12	May	20 48	+82 13
	s	"		s	"		s	"		s	"		s	"
1.6	44.36	37.41	1.6	32.19	35.97	1.7	17.11	54.40	1.7	50.98	57.20	1.8	34.10	32.50
2.6	44.58	37.61	2.6	32.75	36.19	2.7	18.03	54.54	2.7	52.88	57.28	2.8	34.24	32.54
3.6	44.81	37.82	3.6	33.27	36.41	3.7	19.00	54.68	3.7	54.68	57.37	3.8	34.39	32.55
4.6	45.07	38.04	4.6	33.75	36.63	4.7	20.03	54.82	4.7	56.39	57.46	4.7	34.56	32.58
5.6	45.32	38.26	5.6	34.21	36.84	5.7	21.10	54.99	5.7	57.99	57.55	5.7	34.74	32.61
6.6	45.57	38.53	6.6	34.63	37.02	6.7	22.21	55.18	6.7	59.53	57.63	6.7	34.88	32.66
7.6	45.81	38.81	7.6	35.06	37.17	7.7	23.30	55.40	7.7	61.04	57.69	7.7	35.06	32.75
8.6	46.04	39.13	8.6	35.53	37.32	8.7	24.35	55.63	8.7	62.59	57.74	8.7	35.24	32.86
9.6	46.23	39.44	9.6	36.03	37.49	9.7	25.30	55.90	9.7	64.20	57.79	9.7	35.41	32.99
10.6	46.41	39.75	10.6	36.53	37.65	10.7	26.16	56.14	10.7	65.91	57.83	10.7	35.57	33.13
11.6	46.56	40.05	11.6	37.08	37.82	11.7	26.94	56.39	11.7	67.71	57.88	11.7	35.73	33.26
12.6	46.71	40.34	12.6	37.63	38.02	12.7	27.68	56.63	12.7	69.54	57.97	12.7	35.88	33.40
13.6	46.85	40.61	13.6	38.15	38.23	13.6	28.38	56.86	13.7	71.39	58.07	13.7	36.02	33.52
14.6	47.00	40.88	14.6	38.65	38.47	14.6	29.10	57.07	14.7	73.21	58.20	14.7	36.17	33.63
15.6	47.17	41.12	15.6	39.12	38.74	15.6	29.86	57.27	15.7	74.93	58.34	15.7	36.30	33.74
16.6	47.33	41.38	16.6	39.54	39.00	16.6	30.67	57.46	16.7	76.55	58.49	16.7	36.44	33.84
17.6	47.51	41.64	17.6	39.93	39.24	17.6	31.51	57.66	17.7	78.07	58.64	17.7	36.58	33.95
18.6	47.69	41.91	18.6	40.31	39.49	18.6	32.39	57.89	18.7	79.53	58.79	18.7	36.73	34.08
19.6	47.88	42.20	19.6	40.66	39.73	19.6	33.28	58.13	19.7	80.92	58.93	19.7	36.90	34.20
20.6	48.05	42.51	20.6	41.00	39.96	20.6	34.17	58.39	20.7	82.27	59.07	20.7	37.06	34.35
21.6	48.21	42.83	21.6	41.34	40.16	21.6	35.03	58.66	21.6	83.61	59.20	21.7	37.22	34.51
22.6	48.36	43.16	22.6	41.70	40.37	22.6	35.84	58.94	22.6	84.96	59.33	22.7	37.38	34.68
23.6	48.49	43.50	23.6	42.07	40.58	23.6	36.60	59.24	23.6	86.36	59.44	23.7	37.54	34.87
24.6	48.59	43.85	24.6	42.45	40.78	24.6	37.28	59.55	24.6	87.80	59.55	24.7	37.69	35.09
25.6	48.68	44.19	25.6	42.87	41.01	25.6	37.90	59.86	25.6	89.32	59.68	25.7	37.84	35.31
26.6	48.75	44.51	26.6	43.29	41.25	26.6	38.42	60.16	26.6	90.90	59.80	26.7	37.98	35.51
27.6	48.81	44.82	27.6	43.72	41.51	27.6	38.89	60.45	27.6	92.50	59.95	27.7	38.11	35.72
28.6	48.86	45.12	28.6	44.13	41.77	28.6	39.35	60.73	28.6	94.10	60.12	28.7	38.23	35.92
29.6	48.92	45.41	29.6	44.51	42.06	29.6	39.80	60.98	29.6	95.69	60.31	29.7	38.36	36.12
30.6	49.00	45.68	30.6	44.86	42.36	30.6	40.30	61.22	30.6	97.17	60.53	30.7	38.47	36.30
31.6	49.08	45.96	31.6	45.17	42.66	31.6	40.84	61.47	31.6	98.54	60.76	31.7	38.60	36.47
32.6	49.16	46.26	32.6	45.45	42.96	32.6	41.43	61.73	32.6	99.79	60.97	32.7	38.73	36.65
16.92 +16.89			24.50 -24.48			58.23 +58.22			73.10 -73.09			7.39 +7.33		
17 ^h 58 ^m 41 ^s .809			18 ^h 6 ^m 47 ^s .620			19 ^h 1 ^m 27 ^s .463			19 ^h 29 ^m 16 ^s .746			20 ^h 48 ^m 36 ^s .323		
+86° 36' 51".12			-87° 39' 51".38			+89° 1' 7".53			-89° 13' 21".02			+82° 13' 43".34		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT .

W V 100 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

H. Cephei. Mag. 4.5		α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
h m 0 57	° ' +85 49	June	h m 1 30	° ' +88 51	June	h m 1 41	° ' -85 10	June	h m 4 10	° ' +85 20	June	h m 5 35	° ' +85 9
s	"		s	"		s	"		s	"		s	"
13.86	1.54	0.9	23.51	59.89	0.9	43.71	36.11	0.9	17.38	21.80	1.0	29.93	36.55
14.12	1.41	1.9	24.32	59.70	1.9	43.89	35.84	1.9	17.44	21.51	2.0	29.90	36.26
14.39	1.28	2.9	25.20	59.51	2.9	44.04	35.58	2.9	17.51	21.22	3.0	29.88	35.95
14.66	1.14	3.9	26.17	59.32	3.9	44.18	35.33	3.9	17.59	20.89	4.0	29.86	35.61
14.98	1.00	4.9	27.23	59.15	4.9	44.31	35.09	4.9	17.70	20.57	5.0	29.85	35.27
15.30	0.90	5.9	28.35	58.99	5.9	44.44	34.84	5.9	17.84	20.25	6.0	29.89	34.93
15.64	0.82	6.9	29.51	58.85	6.9	44.58	34.57	6.9	18.00	19.95	7.0	29.94	34.58
15.98	0.78	7.9	30.65	58.73	7.9	44.71	34.28	7.9	18.17	19.66	8.0	30.01	34.24
16.30	0.74	8.8	31.74	58.63	8.9	44.87	33.97	8.9	18.33	19.39	9.0	30.09	33.93
16.60	0.71	9.8	32.77	58.55	9.9	45.04	33.67	9.9	18.49	19.14	10.0	30.16	33.65
16.88	0.68	10.8	33.74	58.47	10.9	45.22	33.38	10.9	18.64	18.90	11.0	30.22	33.37
17.15	0.64	11.8	34.66	58.39	11.8	45.42	33.11	11.9	18.78	18.68	12.0	30.27	33.11
17.41	0.59	12.8	35.56	58.30	12.8	45.63	32.85	12.9	18.90	18.45	13.0	30.31	32.84
17.68	0.53	13.8	36.48	58.18	13.8	45.84	32.61	13.9	19.01	18.21	14.0	30.35	32.57
17.95	0.46	14.8	37.42	58.06	14.8	46.05	32.39	14.9	19.13	17.94	15.0	30.38	32.26
18.23	0.40	15.8	38.41	57.94	15.8	46.25	32.19	15.9	19.26	17.67	15.9	30.40	31.96
18.53	0.32	16.8	39.45	57.83	16.8	46.44	32.00	16.9	19.39	17.40	16.9	30.44	31.65
18.85	0.26	17.8	40.55	57.72	17.8	46.62	31.80	17.9	19.54	17.11	17.9	30.49	31.33
19.17	0.22	18.8	41.69	57.61	18.8	46.81	31.61	18.9	19.71	16.83	18.9	30.55	30.99
19.51	0.19	19.8	42.85	57.51	19.8	46.99	31.43	19.9	19.88	16.54	19.9	30.63	30.65
19.85	0.18	20.8	44.06	57.44	20.8	47.16	31.24	20.9	20.08	16.26	20.9	30.72	30.32
20.19	0.18	21.8	45.27	57.38	21.8	47.35	31.02	21.9	20.29	16.00	21.9	30.84	29.99
20.53	0.21	22.8	46.46	57.35	22.8	47.54	30.79	22.9	20.51	15.77	22.9	30.97	29.68
20.85	0.25	23.8	47.62	57.34	23.8	47.74	30.56	23.9	20.73	15.55	23.9	31.11	29.39
21.15	0.31	24.8	48.72	57.34	24.8	47.96	30.33	24.9	20.94	15.35	24.9	31.24	29.13
21.44	0.36	25.8	49.76	57.34	25.8	48.18	30.12	25.9	21.14	15.16	25.9	31.37	28.88
21.72	0.40	26.8	50.76	57.34	26.8	48.43	29.91	26.9	21.34	14.98	26.9	31.48	28.63
22.00	0.43	27.8	51.75	57.32	27.8	48.67	29.72	27.9	21.53	14.79	27.9	31.59	28.37
22.29	0.44	28.8	52.75	57.29	28.8	48.92	29.57	28.9	21.69	14.58	28.9	31.69	28.10
22.57	0.45	29.8	53.79	57.26	29.8	49.15	29.42	29.9	21.86	14.36	29.9	31.77	27.82
22.88	0.46	30.8	54.90	57.21	30.8	49.38	29.29	30.9	22.05	14.12	30.9	31.86	27.51
23.21	0.49	31.8	56.10	57.17	31.8	49.59	29.17	31.9	22.26	13.87	31.9	31.98	27.20
+13.67		50.53 +50.52			11.89 -11.85			12.30 +12.26			11.85 +11.81		
57 ^m 16 ^s .959		1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .554		
49' 4''.72		+88° 52' 2''.06			-85° 11' 3''.34			+85° 20' 19''.62			+85° 9' 32''.39		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	De nat
	h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	' "
June	5 45	-84 49	June	6 46	-80 43	June	7 2	+87 10	June	7 13	+82 34	June	7 15	-86
1.0	39.82	51.28	1.1	42.75	56.84	1.1	31.51	55.07	1.1	55.98	29.30	1.1	25.42	31
2.0	39.73	50.97	2.1	42.67	56.56	2.1	31.29	54.81	2.1	55.90	29.07	2.1	25.14	31
3.0	39.64	50.69	3.1	42.60	56.31	3.1	31.07	54.51	3.1	55.82	28.79	3.1	24.88	31
4.0	39.56	50.43	4.1	42.53	56.07	4.1	30.87	54.20	4.1	55.73	28.51	4.1	24.62	31
5.0	39.47	50.18	5.1	42.46	55.83	5.1	30.69	53.88	5.1	55.66	28.20	5.1	24.36	30.
6.0	39.38	49.92	6.1	42.38	55.62	6.1	30.55	53.55	6.1	55.61	27.89	6.1	24.09	30.
7.0	39.26	49.64	7.1	42.30	55.40	7.1	30.44	53.20	7.1	55.56	27.56	7.1	23.79	30.
8.0	39.16	49.35	8.1	42.22	55.17	8.1	30.38	52.86	8.1	55.54	27.24	8.1	23.48	30.
9.0	39.05	49.04	9.1	42.14	54.91	9.1	30.32	52.54	9.1	55.53	26.93	9.1	23.17	30.
10.0	38.95	48.72	10.1	42.06	54.63	10.1	30.28	52.25	10.1	55.52	26.64	10.1	22.87	29.
11.0	38.86	48.36	11.1	41.98	54.31	11.1	30.23	51.97	11.1	55.49	26.38	11.1	22.58	29.
12.0	38.79	48.02	12.1	41.92	53.99	12.1	30.16	51.69	12.1	55.46	26.12	12.1	22.30	29.
13.0	38.73	47.67	13.1	41.86	53.67	13.1	30.08	51.42	13.1	55.44	25.87	13.1	22.05	29.
14.0	38.69	47.33	14.1	41.81	53.35	14.1	29.97	51.15	14.1	55.40	25.61	14.1	21.82	28.
15.0	38.66	47.00	15.0	41.75	53.04	15.1	29.87	50.87	15.1	55.35	25.34	15.1	21.61	28.
16.0	38.62	46.69	16.0	41.70	52.74	16.1	29.76	50.56	16.1	55.30	25.05	16.1	21.42	28.
17.0	38.59	46.41	17.0	41.65	52.45	17.1	29.64	50.24	17.1	55.25	24.74	17.1	21.24	27.
18.0	38.57	46.12	18.0	41.61	52.18	18.1	29.54	49.92	18.1	55.21	24.43	18.1	21.06	27.
18.9	38.54	45.82	19.0	41.57	51.92	19.0	29.46	49.56	19.1	55.17	24.12	19.1	20.88	27.
19.9	38.51	45.53	20.0	41.52	51.66	20.0	29.41	49.21	20.1	55.16	23.79	20.1	20.70	27.
20.9	38.48	45.24	21.0	41.49	51.40	21.0	29.40	48.85	21.1	55.15	23.46	21.1	20.51	26.
21.9	38.44	44.95	22.0	41.44	51.13	22.0	29.40	48.52	22.0	55.15	23.12	22.1	20.30	26
22.9	38.40	44.64	23.0	41.40	50.85	23.0	29.44	48.18	23.0	55.16	22.79	23.0	20.08	26
23.9	38.36	44.33	24.0	41.35	50.54	24.0	29.49	47.85	24.0	55.19	22.47	24.0	19.86	26
24.9	38.32	43.99	25.0	41.30	50.22	25.0	29.55	47.54	25.0	55.21	22.17	25.0	19.65	25
25.9	38.30	43.65	26.0	41.26	49.89	26.0	29.62	47.25	26.0	55.23	21.89	26.0	19.45	25
26.9	38.29	43.29	27.0	41.22	49.55	27.0	29.67	46.96	27.0	55.25	21.62	27.0	19.26	25
27.9	38.30	42.92	28.0	41.19	49.19	28.0	29.69	46.68	28.0	55.26	21.35	28.0	19.12	24
28.9	38.32	42.58	29.0	41.17	48.85	29.0	29.70	46.40	29.0	55.25	21.08	29.0	18.98	24
29.9	38.35	42.25	30.0	41.16	48.53	30.0	29.69	46.09	30.0	55.24	20.77	30.0	18.89	24
30.9	38.38	41.94	31.0	41.15	48.22	31.0	29.67	45.76	31.0	55.23	20.45	31.0	18.80	24
31.9	38.41	41.66	32.0	41.13	47.94	32.0	29.68	45.39	32.0	55.23	20.09	32.0	18.71	23
11.10 -11.05			6.21 -6.13			20.33 +20.31			7.74 +7.67			18.54 -18.51		
5 ^h 46 ^m 3 ^s .075			6 ^h 46 ^m 53 ^s .600			7 ^h 2 ^m 33 ^s .206			7 ^h 13 ^m 55 ^s .106			7 ^h 16 ^m 0 ^s .0		
-84° 49' 45".59			-80° 43' 42".15			+87° 10' 49".32			+82° 34' 23".73			-86° 54' 13".1		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Cambridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleonis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
June	8 16	+88 52	June	9 8	-85 20	June	9 25	+81 41	June	9 36	-80 34	June	10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
1.2	47.36	55.57	1.2	37.54	42.52	1.2	33.24	31.71	1.2	17.35	55.38	1.2	16.05	41.41
2.1	46.56	55.37	2.2	37.30	42.42	2.2	33.11	31.61	2.2	17.22	55.30	2.2	15.88	41.38
3.1	45.72	55.14	3.2	37.06	42.32	3.2	32.97	31.48	3.2	17.11	55.24	3.2	15.70	41.33
4.1	44.87	54.91	4.2	36.84	42.25	4.2	32.83	31.31	4.2	17.00	55.18	4.2	15.53	41.25
5.1	44.06	54.63	5.2	36.62	42.19	5.2	32.70	31.15	5.2	16.90	55.14	5.2	15.35	41.16
6.1	43.33	54.32	6.2	36.40	42.14	6.2	32.59	30.97	6.2	16.80	55.11	6.2	15.17	41.03
7.1	42.67	54.01	7.2	36.16	42.09	7.2	32.48	30.73	7.2	16.69	55.09	7.2	15.02	40.90
8.1	42.12	53.72	8.2	35.91	42.03	8.2	32.37	30.51	8.2	16.56	55.06	8.2	14.87	40.75
9.1	41.64	53.44	9.2	35.65	41.95	9.2	32.28	30.31	9.2	16.44	55.02	9.2	14.73	40.59
10.1	41.19	53.16	10.2	35.39	41.86	10.2	32.19	30.12	10.2	16.31	54.96	10.2	14.61	40.45
11.1	40.75	52.90	11.2	35.12	41.73	11.2	32.11	29.93	11.2	16.18	54.87	11.2	14.49	40.32
12.1	40.28	52.66	12.2	34.85	41.59	12.2	32.03	29.74	12.2	16.04	54.77	12.2	14.37	40.20
13.1	39.76	52.43	13.2	34.60	41.44	13.2	31.94	29.58	13.2	15.92	54.63	13.2	14.24	40.09
14.1	39.20	52.19	14.2	34.36	41.27	14.2	31.85	29.42	14.2	15.79	54.49	14.2	14.10	39.98
15.1	38.60	51.93	15.1	34.13	41.10	15.2	31.74	29.26	15.2	15.69	54.35	15.2	13.94	39.87
16.1	37.98	51.67	16.1	33.94	40.93	16.2	31.62	29.08	16.2	15.58	54.21	16.2	13.79	39.75
17.1	37.36	51.39	17.1	33.73	40.77	17.2	31.51	28.89	17.2	15.48	54.07	17.2	13.62	39.62
18.1	36.74	51.11	18.1	33.53	40.63	18.2	31.40	28.68	18.2	15.38	53.94	18.2	13.47	39.48
19.1	36.17	50.80	19.1	33.34	40.49	19.2	31.29	28.46	19.2	15.28	53.82	19.2	13.32	39.31
20.1	35.65	50.47	20.1	33.14	40.36	20.1	31.19	28.20	20.2	15.18	53.70	20.2	13.16	39.13
21.1	35.18	50.13	21.1	32.95	40.22	21.1	31.09	27.94	21.2	15.09	53.60	21.2	13.01	38.94
22.1	34.80	49.79	22.1	32.75	40.09	22.1	31.01	27.68	22.1	14.99	53.48	22.2	12.88	38.72
23.1	34.50	49.45	23.1	32.53	39.95	23.1	30.93	27.41	23.1	14.89	53.35	23.2	12.75	38.49
24.1	34.26	49.14	24.1	32.31	39.82	24.1	30.88	27.15	24.1	14.78	53.22	24.2	12.64	38.27
25.1	34.06	48.82	25.1	32.07	39.64	25.1	30.82	26.89	25.1	14.67	53.09	25.2	12.54	38.07
26.1	33.87	48.53	26.1	31.84	39.44	26.1	30.77	26.65	26.1	14.55	52.92	26.2	12.44	37.87
27.1	33.65	48.26	27.1	31.61	39.22	27.1	30.71	26.42	27.1	14.44	52.74	27.2	12.35	37.68
28.1	33.37	47.98	28.1	31.41	38.99	28.1	30.64	26.21	28.1	14.33	52.54	28.2	12.22	37.50
29.1	33.03	47.71	29.1	31.22	38.75	29.1	30.55	25.99	29.1	14.22	52.33	29.2	12.10	37.33
30.1	32.65	47.40	30.1	31.05	38.52	30.1	30.47	25.75	30.1	14.12	52.13	30.2	11.98	37.14
31.1	32.25	47.09	31.1	30.88	38.30	31.1	30.39	25.49	31.1	14.04	51.94	31.2	11.84	36.95
32.1	31.87	46.76	32.1	30.74	38.10	32.1	30.29	25.22	32.1	13.96	51.75	32.2	11.69	36.73
31.21	+51.20		12.32	-12.28		6.92	+6.85		6.11	-6.03		8.18	+8.12	
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
18° 52' 49".08			-85° 20' 12".12			+81° 41' 25".82			-80° 34' 23".04			+82° 58' 35".87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
June	10 59	-84 9	June	12 14	+88 9	June	12 46	-84 41	June	12 48	+83 51	June	13 27	-85 22
	s	"		s	"		s	"		s	"		s	"
1.3	56.19	45.15	1.3	41.65	20.16	1.3	25.71	14.15	1.3	36.68	33.82	1.4	42.34	29.98
2.3	55.99	45.21	2.3	41.03	20.26	2.3	25.52	14.33	2.3	36.52	33.97	2.4	42.16	30.21
3.3	55.80	45.26	3.3	40.37	20.36	3.3	25.37	14.51	3.3	36.33	34.12	3.4	42.01	30.43
4.3	55.62	45.31	4.3	39.67	20.46	4.3	25.22	14.68	4.3	36.14	34.27	4.4	41.86	30.64
5.3	55.45	45.39	5.3	38.93	20.52	5.3	25.07	14.85	5.3	35.92	34.41	5.4	41.73	30.86
6.2	55.28	45.47	6.3	38.18	20.56	6.3	24.94	15.05	6.3	35.71	34.50	6.4	41.61	31.09
7.2	55.11	45.57	7.3	37.46	20.57	7.3	24.80	15.27	7.3	35.51	34.57	7.4	41.49	31.33
8.2	54.93	45.67	8.3	36.76	20.57	8.3	24.66	15.49	8.3	35.32	34.62	8.3	41.37	31.00
9.2	54.73	45.74	9.3	36.12	20.56	9.3	24.49	15.71	9.3	35.13	34.66	9.3	41.21	31.87
10.2	54.52	45.80	10.3	35.51	20.54	10.3	24.32	15.93	10.3	34.96	34.70	10.3	41.03	32.14
11.2	54.30	45.85	11.3	34.92	20.53	11.3	24.13	16.13	11.3	34.79	34.74	11.3	40.84	32.39
12.2	54.08	45.89	12.3	34.36	20.54	12.3	23.91	16.32	12.3	34.62	34.80	12.3	40.64	32.62
13.2	53.86	45.89	13.3	33.77	20.57	13.3	23.71	16.47	13.3	34.45	34.87	13.3	40.42	32.82
14.2	53.64	45.87	14.3	33.16	20.58	14.3	23.51	16.61	14.3	34.28	34.95	14.3	40.21	33.01
15.2	53.45	45.84	15.3	32.53	20.60	15.3	23.30	16.73	15.3	34.10	35.02	15.3	39.99	33.19
16.2	53.25	45.81	16.3	31.87	20.63	16.3	23.10	16.83	16.3	33.91	35.10	16.3	39.80	33.33
17.2	53.07	45.78	17.3	31.18	20.66	17.3	22.91	16.92	17.3	33.71	35.16	17.3	39.60	33.48
18.2	52.88	45.75	18.3	30.45	20.66	18.3	22.74	17.03	18.3	33.51	35.22	18.3	39.41	33.62
19.2	52.71	45.75	19.3	29.72	20.65	19.3	22.57	17.15	19.3	33.29	35.29	19.3	39.24	33.78
20.2	52.53	45.73	20.3	28.99	20.61	20.3	22.40	17.28	20.3	33.08	35.33	20.3	39.05	33.95
21.2	52.36	45.73	21.3	28.27	20.56	21.3	22.23	17.41	21.3	32.86	35.34	21.3	38.88	34.12
22.2	52.19	45.73	22.3	27.56	20.49	22.3	22.05	17.53	22.3	32.66	35.35	22.3	38.71	34.30
23.2	51.99	45.74	23.3	26.89	20.41	23.3	21.88	17.67	23.3	32.46	35.32	23.3	38.54	34.49
24.2	51.80	45.74	24.3	26.24	20.31	24.3	21.69	17.81	24.3	32.27	35.28	24.3	38.35	34.68
25.2	51.59	45.71	25.2	25.64	20.21	25.3	21.48	17.95	25.3	32.10	35.23	25.3	38.15	34.87
26.2	51.37	45.66	26.2	25.07	20.11	26.3	21.26	18.06	26.3	31.92	35.19	26.3	37.91	35.04
27.2	51.15	45.59	27.2	24.50	20.04	27.3	21.03	18.16	27.3	31.76	35.17	27.3	37.66	35.18
28.2	50.95	45.51	28.2	23.92	19.98	28.3	20.80	18.22	28.3	31.58	35.16	28.3	37.41	35.32
29.2	50.75	45.42	29.2	23.32	19.93	29.3	20.57	18.27	29.3	31.40	35.17	29.3	37.16	35.42
30.2	50.56	45.32	30.2	22.67	19.87	30.3	20.37	18.32	30.3	31.21	35.17	30.3	36.92	35.52
31.2	50.38	45.22	31.2	21.97	19.83	31.3	20.17	18.35	31.3	31.00	35.17	31.3	36.70	35.60
32.2	50.23	45.14	32.2	21.23	19.75	32.3	19.99	18.39	32.3	30.77	35.14	32.3	36.51	35.69
9.83 -9.78			31.07 +31.06			10.80 -10.76			9.35 +9.30			12.40 -12.36		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
-84° 9' 9''.97			+88° 9' 16''.14			-84° 40' 41''.95			+83° 51' 30''.88			-85° 22' 0''.86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
June	14 13	−83 18	June	15 3	+87 32	June	15 24	−84 11	June	16 54	+82 10	June	17 16	−80 47
	s	"		s	"		s	"		s	"		s	"
1.4	53.68	2.38	1.4	34.27	56.11	1.4	32.94	58.75	1.5	24.34	23.40	1.5	22.87	10.02
2.4	53.59	2.65	2.4	34.04	56.38	2.4	32.90	59.04	2.5	24.33	23.73	2.5	22.91	10.31
3.4	53.50	2.89	3.4	33.77	56.68	3.4	32.86	59.33	3.5	24.33	24.09	3.5	22.95	10.57
4.4	53.44	3.14	4.4	33.46	56.98	4.4	32.83	59.60	4.5	24.32	24.45	4.5	23.00	10.81
5.4	53.38	3.38	5.4	33.10	57.27	5.4	32.83	59.86	5.5	24.29	24.81	5.5	23.04	11.05
6.4	53.33	3.63	6.4	32.73	57.55	6.4	32.83	60.13	6.5	24.26	25.18	6.5	23.10	11.28
7.4	53.28	3.90	7.4	32.35	57.79	7.4	32.83	60.43	7.5	24.21	25.54	7.5	23.18	11.54
8.4	53.23	4.19	8.4	31.95	58.02	8.4	32.83	60.74	8.5	24.17	25.88	8.5	23.26	11.82
9.4	53.16	4.48	9.4	31.58	58.21	9.4	32.82	61.07	9.5	24.13	26.19	9.5	23.32	12.12
10.4	53.08	4.78	10.4	31.24	58.41	10.4	32.79	61.41	10.5	24.08	26.48	10.5	23.38	12.43
11.4	52.98	5.07	11.4	30.90	58.60	11.4	32.75	61.73	11.5	24.04	26.76	11.5	23.43	12.76
12.4	52.88	5.35	12.4	30.59	58.80	12.4	32.67	62.06	12.5	24.01	27.04	12.5	23.47	13.10
13.4	52.75	5.61	13.4	30.28	59.02	13.4	32.60	62.37	13.5	23.97	27.33	13.5	23.48	13.41
14.4	52.64	5.84	14.4	29.97	59.24	14.4	32.52	62.68	14.5	23.94	27.64	14.5	23.49	13.72
15.4	52.52	6.06	15.4	29.64	59.47	15.4	32.43	62.93	15.5	23.90	27.95	15.5	23.50	14.00
16.4	52.40	6.25	16.4	29.28	59.71	16.4	32.35	63.16	16.5	23.86	28.27	16.5	23.51	14.28
17.4	52.30	6.43	17.4	28.91	59.94	17.4	32.27	63.41	17.5	23.81	28.61	17.5	23.52	14.54
18.4	52.20	6.62	18.4	28.51	60.19	18.4	32.19	63.65	18.5	23.77	28.96	18.5	23.53	14.78
19.3	52.09	6.82	19.4	28.10	60.42	19.4	32.13	63.89	19.5	23.71	29.30	19.5	23.54	15.03
20.3	52.00	7.04	20.4	27.65	60.65	20.4	32.07	64.13	20.5	23.63	29.65	20.5	23.57	15.28
21.3	51.91	7.25	21.4	27.20	60.84	21.4	32.01	64.40	21.5	23.55	29.99	21.5	23.59	15.55
22.3	51.82	7.47	22.4	26.73	61.03	22.4	31.96	64.66	22.5	23.48	30.30	22.5	23.63	15.82
23.3	51.73	7.68	23.4	26.27	61.18	23.4	31.90	64.93	23.5	23.40	30.58	23.5	23.67	16.11
24.3	51.62	7.91	24.4	25.81	61.33	24.4	31.83	65.22	24.4	23.33	30.86	24.5	23.70	16.41
25.3	51.50	8.14	25.4	25.39	61.46	25.4	31.75	65.52	25.4	23.24	31.12	25.5	23.71	16.73
26.3	51.37	8.37	26.4	24.97	61.59	26.4	31.66	65.81	26.4	23.17	31.36	26.5	23.72	17.05
27.3	51.23	8.57	27.4	24.58	61.73	27.4	31.53	66.10	27.4	23.10	31.62	27.5	23.71	17.38
28.3	51.07	8.76	28.4	24.18	61.88	28.4	31.40	66.35	28.4	23.03	31.88	28.5	23.70	17.70
29.3	50.93	8.90	29.4	23.79	62.04	29.4	31.27	66.58	29.4	22.95	32.16	29.4	23.67	17.98
30.3	50.78	9.05	30.4	23.38	62.22	30.4	31.15	66.78	30.4	22.88	32.46	30.4	23.64	18.25
31.3	50.64	9.17	31.4	22.92	62.39	31.4	31.03	66.98	31.4	22.80	32.77	31.4	23.63	18.48
32.3	50.52	9.29	32.3	22.42	62.57	32.4	30.93	67.17	32.4	22.71	33.10	32.4	23.62	18.71
8.57	−8.51		23.39	+23.37		9.90	−9.85		7.34	+7.28		6.25	−6.17	
14 ^h 13 ^m	37 ^s .066		15 ^h 3 ^m	21 ^s .809		15 ^h 24 ^m	9 ^s .966		16 ^h 54 ^m	19 ^s .238		17 ^h 16 ^m	6 ^s .064	
−83° 17'	37'' .78		+87° 32'	56'' .60		−84° 11'	42'' .92		+82° 10'	27'' .09		−80° 47'	10'' .43	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m 17 58	° ' " +86 36	June	h m 18 7	° ' " -87 39	June	h m 19 1	° ' " +89 1	June	h m 19 31	° ' " -89 13	June	h m 20 48	° ' " +82 13
	s "	"		s "	"		s "	"		s "	"		s "	"
1.6	49.16	46.26	1.6	45.45	42.96	1.6	41.43	1.73	1.6	39.79	0.97	1.7	38.73	36.65
2.6	49.25	46.58	2.6	45.68	43.24	2.6	42.05	2.01	2.6	40.96	1.17	2.7	38.86	36.84
3.5	49.34	46.92	3.6	45.93	43.48	3.6	42.68	2.32	3.6	42.06	1.35	3.7	38.99	37.07
4.5	49.41	47.28	4.6	46.18	43.72	4.6	43.26	2.64	4.6	43.16	1.53	4.7	39.14	37.30
5.5	49.46	47.65	5.6	46.45	43.95	5.6	43.75	2.97	5.6	44.32	1.70	5.7	39.29	37.57
6.5	49.47	48.02	6.5	46.75	44.17	6.6	44.15	3.32	6.6	45.56	1.86	6.7	39.42	37.85
7.5	49.46	48.37	7.5	47.07	44.42	7.6	44.46	3.68	7.6	46.88	2.02	7.7	39.55	38.14
8.5	49.43	48.71	8.5	47.40	44.68	8.6	44.69	4.01	8.6	48.27	2.20	8.7	39.66	38.44
9.5	49.40	49.05	9.5	47.74	44.95	9.6	44.87	4.33	9.6	49.67	2.40	9.7	39.77	38.71
10.5	49.37	49.35	10.5	48.05	45.26	10.6	45.06	4.62	10.6	51.03	2.62	10.6	39.87	38.97
11.5	49.36	49.64	11.5	48.33	45.59	11.6	45.27	4.91	11.6	52.32	2.86	11.6	39.96	39.22
12.5	49.35	49.93	12.5	48.55	45.91	12.6	45.52	5.18	12.6	53.51	3.12	12.6	40.07	39.46
13.5	49.35	50.23	13.5	48.74	46.23	13.6	45.81	5.46	13.6	54.60	3.38	13.6	40.17	39.69
14.5	49.36	50.54	14.5	48.90	46.55	14.6	46.14	5.76	14.6	55.58	3.64	14.6	40.27	39.92
15.5	49.36	50.86	15.5	49.04	46.84	15.6	46.48	6.07	15.6	56.48	3.88	15.6	40.38	40.18
16.5	49.37	51.18	16.5	49.16	47.13	16.6	46.83	6.38	16.6	57.33	4.13	16.6	40.49	40.44
17.5	49.36	51.53	17.5	49.28	47.40	17.6	47.13	6.72	17.6	58.15	4.36	17.6	40.61	40.71
18.5	49.33	51.89	18.5	49.41	47.66	18.6	47.42	7.05	18.6	58.96	4.58	18.6	40.72	41.00
19.5	49.30	52.25	19.5	49.55	47.92	19.5	47.63	7.42	19.6	59.80	4.82	19.6	40.84	41.31
20.5	49.24	52.62	20.5	49.70	48.17	20.5	47.78	7.78	20.6	60.68	5.04	20.6	40.94	41.63
21.5	49.16	52.98	21.5	49.87	48.44	21.5	47.85	8.14	21.6	61.61	5.26	21.6	41.04	41.96
22.5	49.06	53.31	22.5	50.05	48.71	22.5	47.83	8.50	22.6	62.61	5.48	22.6	41.13	42.28
23.5	48.95	53.65	23.5	50.24	49.00	23.5	47.75	8.84	23.6	63.63	5.71	23.6	41.21	42.62
24.5	48.82	53.96	24.5	50.42	49.32	24.5	47.63	9.16	24.6	64.66	5.98	24.6	41.29	42.94
25.5	48.71	54.25	25.5	50.59	49.65	25.5	47.50	9.48	25.6	65.67	6.24	25.6	41.35	43.25
26.5	48.60	54.53	26.5	50.73	49.99	26.5	47.40	9.77	26.5	66.60	6.52	26.6	41.41	43.54
27.5	48.50	54.81	27.5	50.81	50.32	27.5	47.34	10.07	27.5	67.42	6.83	27.6	41.49	43.82
28.5	48.40	55.09	28.5	50.85	50.66	28.5	47.32	10.36	28.5	68.12	7.13	28.6	41.56	44.10
29.5	48.31	55.40	29.5	50.85	50.98	29.5	47.35	10.68	29.5	68.71	7.42	29.6	41.63	44.40
30.5	48.23	55.73	30.5	50.84	51.27	30.5	47.39	11.01	30.5	69.19	7.70	30.6	41.73	44.71
31.5	48.13	56.08	31.5	50.84	51.55	31.5	47.40	11.37	31.5	69.66	7.98	31.6	41.79	45.04
32.5	48.01	56.44	32.5	50.87	51.81	32.5	47.35	11.75	32.5	70.16	8.22	32.6	41.88	45.40
16.93 +16.90			24.52 -24.50			58.37 +58.36			73.24 -73.24			7.40 +7.33		
17 ^h 58 ^m 41 ^s .809			18 ^h 6 ^m 47 ^s .620			19 ^h 1 ^m 27 ^s .463			19 ^h 29 ^m 16 ^s .746			20 ^h 48 ^m 36 ^s .323		
+86° 36' 51".12			-87° 39' 51".38			+89° 1' 7".53			-89° 13' 21".02			+82° 13' 43".34		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ ¹ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m	° '	June	h m	° '	June	h m	° '	June	h m	° '	June	h m	° '
	s	"		s	"		s	"		s	"		s	"
1.7	38.94	18.85	1.7	31.92	35.12	1.7	49.94	9.43	1.8	41.28	13.58	1.8	19.49	54.30
2.7	39.13	18.88	2.7	32.26	35.10	2.7	50.09	9.37	2.8	41.67	13.56	2.8	19.64	54.16
3.7	39.29	18.89	3.7	32.59	35.07	3.7	50.24	9.32	3.8	42.09	13.54	3.8	19.78	54.01
4.7	39.45	18.90	4.7	32.89	35.04	4.7	50.38	9.25	4.8	42.54	13.55	4.8	19.92	53.86
5.7	39.62	18.91	5.7	33.19	35.00	5.7	50.52	9.16	5.8	42.99	13.58	5.8	20.05	53.70
6.7	39.80	18.90	6.7	33.51	34.95	6.7	50.66	9.07	6.8	43.45	13.63	6.8	20.19	53.53
7.7	39.98	18.88	7.7	33.86	34.90	7.7	50.82	8.97	7.8	43.88	13.71	7.8	20.34	53.35
8.7	40.18	18.87	8.7	34.22	34.84	8.7	50.99	8.88	8.8	44.28	13.81	8.8	20.50	53.15
9.7	40.39	18.88	9.7	34.60	34.80	9.7	51.17	8.80	9.8	44.66	13.91	9.8	20.68	52.97
10.7	40.61	18.91	10.7	34.99	34.79	10.7	51.35	8.74	10.8	45.03	13.99	10.8	20.87	52.81
11.7	40.82	18.97	11.7	35.39	34.78	11.7	51.53	8.69	11.8	45.38	14.06	11.8	21.06	52.67
12.7	41.01	19.05	12.7	35.77	34.80	12.7	51.71	8.68	12.8	45.72	14.12	12.8	21.24	52.56
13.7	41.20	19.14	13.7	36.14	34.84	13.7	51.87	8.69	13.7	46.09	14.17	13.8	21.41	52.46
14.7	41.38	19.24	14.7	36.48	34.90	14.7	52.03	8.71	14.7	46.45	14.22	14.8	21.58	52.38
15.7	41.55	19.34	15.7	36.80	34.97	15.7	52.18	8.73	15.7	46.85	14.27	15.8	21.74	52.30
16.7	41.70	19.43	16.7	37.11	35.04	16.7	52.32	8.75	16.7	47.25	14.33	16.8	21.90	52.24
17.7	41.85	19.53	17.7	37.41	35.09	17.7	52.46	8.76	17.7	47.66	14.40	17.8	22.04	52.18
18.7	42.01	19.61	18.7	37.71	35.14	18.7	52.61	8.78	18.7	48.08	14.48	18.8	22.19	52.11
19.7	42.16	19.69	19.7	38.01	35.18	19.7	52.74	8.79	19.7	48.51	14.58	19.7	22.33	52.04
20.7	42.32	19.76	20.7	38.31	35.22	20.7	52.88	8.79	20.7	48.94	14.70	20.7	22.49	51.96
21.7	42.48	19.83	21.7	38.62	35.25	21.7	53.03	8.78	21.7	49.36	14.83	21.7	22.65	51.87
22.7	42.65	19.91	22.7	38.95	35.28	22.7	53.18	8.77	22.7	49.76	14.98	22.7	22.81	51.77
23.6	42.83	20.00	23.7	39.31	35.33	23.7	53.35	8.77	23.7	50.14	15.15	23.7	22.99	51.68
24.6	43.03	20.09	24.7	39.67	35.38	24.7	53.52	8.79	24.7	50.50	15.33	24.7	23.16	51.60
25.6	43.22	20.21	25.7	40.03	35.46	25.7	53.69	8.82	25.7	50.84	15.49	25.7	23.35	51.53
26.6	43.41	20.34	26.7	40.40	35.55	26.7	53.87	8.86	26.7	51.16	15.64	26.7	23.54	51.47
27.6	43.59	20.49	27.7	40.75	35.66	27.7	54.04	8.94	27.7	51.48	15.78	27.7	23.73	51.44
28.6	43.74	20.66	28.7	41.09	35.79	28.7	54.19	9.03	28.7	51.81	15.91	28.7	23.91	51.43
29.6	43.88	20.83	29.7	41.38	35.93	29.7	54.33	9.13	29.7	52.17	16.03	29.7	24.08	51.44
30.6	44.03	20.99	30.7	41.67	36.05	30.7	54.46	9.23	30.7	52.55	16.17	30.7	24.23	51.45
31.6	44.15	21.14	31.7	41.92	36.16	31.7	54.59	9.32	31.7	52.95	16.33	31.7	24.37	51.46
32.6	44.27	21.28	32.6	42.17	36.27	32.7	54.71	9.39	32.7	53.37	16.51	32.7	24.51	51.46
8.31	-8.25		15.82	-15.79		7.01	-6.94		18.22	+18.19		7.63	-7.56	
21 ^h 38 ^m 29 ^s .050			22 ^h 16 ^m 20 ^s .949			22 ^h 37 ^m 45 ^s .323			23 ^h 27 ^m 43 ^s .851			23 ^h 47 ^m 20 ^s .032		
-83° 5' 50''.66			-86° 23' 9''.03			-81° 48' 43''.57			+86° 51' 18''.76			-82° 28' 28''.42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m 0 57	° ' +85 49	July	h m 1 30	° ' +88 51	July	h m 1 41	° ' -85 10	July	h m 4 10	° ' +85 20	July	h m 5 35	° ' +85 9
	s	"		s	"		s	"		s	"		s	"
0.8	22.88	0.46	0.8	54.90	57.21	0.8	49.38	29.29	0.9	22.05	14.12	0.9	31.86	27.51
1.8	23.21	0.49	1.8	56.10	57.17	1.8	49.59	29.17	1.9	22.26	13.87	1.9	31.98	27.20
2.8	23.56	0.53	2.8	57.37	57.15	2.8	49.78	29.04	2.9	22.49	13.61	2.9	32.11	26.88
3.8	23.91	0.58	3.8	58.67	57.14	3.8	49.97	28.93	3.9	22.75	13.37	3.9	32.28	26.56
4.8	24.26	0.68	4.8	59.97	57.17	4.8	50.17	28.78	4.9	23.02	13.16	4.9	32.45	26.25
5.8	24.61	0.79	5.8	61.22	57.21	5.8	50.38	28.62	5.9	23.29	12.97	5.9	32.64	25.96
6.8	24.93	0.91	6.8	62.42	57.27	6.8	50.61	28.46	6.9	23.56	12.83	6.9	32.84	25.69
7.7	25.25	1.04	7.8	63.54	57.35	7.8	50.85	28.30	7.9	23.82	12.69	7.9	33.03	25.45
8.7	25.53	1.15	8.8	64.60	57.41	8.8	51.11	28.14	8.9	24.06	12.55	8.9	33.20	25.22
9.7	25.81	1.25	9.8	65.63	57.47	9.8	51.37	28.02	9.9	24.29	12.41	9.9	33.36	25.00
10.7	26.08	1.35	10.8	66.65	57.53	10.8	51.64	27.92	10.9	24.50	12.26	10.9	33.51	24.78
11.7	26.36	1.43	11.8	67.67	57.57	11.8	51.89	27.84	11.9	24.71	12.09	11.9	33.65	24.53
12.7	26.64	1.52	12.8	68.73	57.58	12.8	52.14	27.78	12.9	24.93	11.92	12.9	33.79	24.27
13.7	26.95	1.60	13.8	69.84	57.61	13.8	52.39	27.72	13.9	25.16	11.73	13.9	33.94	24.01
14.7	27.26	1.68	14.8	71.00	57.65	14.8	52.64	27.67	14.9	25.38	11.55	14.9	34.10	23.74
15.7	27.58	1.78	15.7	72.19	57.68	15.8	52.86	27.64	15.9	25.63	11.37	15.9	34.27	23.46
16.7	27.90	1.89	16.7	73.41	57.73	16.8	53.08	27.60	16.9	25.90	11.19	16.9	34.44	23.19
17.7	28.23	2.03	17.7	74.66	57.81	17.8	53.30	27.54	17.9	26.18	11.02	17.9	34.64	22.90
18.7	28.56	2.19	18.7	75.92	57.90	18.7	53.52	27.49	18.9	26.46	10.86	18.9	34.86	22.63
19.7	28.89	2.37	19.7	77.15	58.02	19.7	53.74	27.42	19.8	26.76	10.74	19.9	35.09	22.39
20.7	29.20	2.54	20.7	78.35	58.15	20.7	53.97	27.34	20.8	27.07	10.63	20.9	35.33	22.16
21.7	29.50	2.72	21.7	79.50	58.28	21.7	54.22	27.25	21.8	27.37	10.53	21.9	35.57	21.95
22.7	29.79	2.92	22.7	80.59	58.43	22.7	54.49	27.18	22.8	27.66	10.43	22.9	35.80	21.75
23.7	30.07	3.13	23.7	81.63	58.57	23.7	54.76	27.12	23.8	27.94	10.35	23.9	36.02	21.58
24.7	30.31	3.31	24.7	82.62	58.71	24.7	55.03	27.08	24.8	28.20	10.28	24.9	36.24	21.40
25.7	30.56	3.48	25.7	83.60	58.82	25.7	55.31	27.06	25.8	28.45	10.21	25.9	36.44	21.21
26.7	30.83	3.63	26.7	84.61	58.93	26.7	55.57	27.07	26.8	28.70	10.10	26.9	36.63	20.99
27.7	31.11	3.78	27.7	85.68	59.03	27.7	55.82	27.10	27.8	28.96	9.98	27.9	36.82	20.77
28.7	31.39	3.94	28.7	86.83	59.13	28.7	56.05	27.13	28.8	29.23	9.85	28.9	37.03	20.54
29.7	31.71	4.11	29.7	88.04	59.25	29.7	56.27	27.16	29.8	29.53	9.71	29.9	37.25	20.29
30.7	32.04	4.30	30.7	89.29	59.38	30.7	56.48	27.19	30.8	29.84	9.59	30.9	37.50	20.05
31.7	32.36	4.52	31.7	90.55	59.55	31.7	56.69	27.20	31.8	30.16	9.48	31.9	37.77	19.82
13.71 +13.67			50.53 +50.52			11.89 -11.84			12.30 +12.26			11.84 +11.80		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .554		
+85° 49' 4".72			+88° 52' 2".06			-85° 11' 3".34			+85° 20' 19".62			+85° 9' 32".39		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			ζ Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m 5 45	° ' -84 49	July	h m 6 46	° ' -80 43	July	h m 7 2	° ' +87 10	July	h m 7 13	° ' +82 34	July	h m 7 15	° ' -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.9	38.38	41.94	1.0	41.15	48.22	1.0	29.67	45.76	1.0	55.23	20.45	1.0	18.80	24.02
1.9	38.41	41.66	2.0	41.13	47.94	2.0	29.68	45.39	2.0	55.23	20.09	2.0	18.71	23.77
2.9	38.44	41.38	3.0	41.12	47.66	3.0	29.72	45.02	3.0	55.25	19.73	3.0	18.62	23.53
3.9	38.45	41.11	3.9	41.11	47.38	4.0	29.80	44.65	4.0	55.28	19.38	4.0	18.50	23.29
4.9	38.45	40.82	4.9	41.10	47.12	5.0	29.93	44.28	5.0	55.33	19.02	5.0	18.38	23.02
5.9	38.46	40.51	5.9	41.08	46.83	6.0	30.07	43.93	6.0	55.38	18.67	6.0	18.24	22.75
6.9	38.48	40.20	6.9	41.06	46.51	7.0	30.25	43.61	7.0	55.44	18.36	7.0	18.11	22.47
7.9	38.50	39.86	7.9	41.04	46.17	7.9	30.40	43.30	8.0	55.50	18.07	8.0	17.98	22.15
8.9	38.53	39.52	8.9	41.03	45.84	8.9	30.55	43.02	9.0	55.56	17.78	9.0	17.87	21.82
9.9	38.58	39.19	9.9	41.02	45.47	9.9	30.68	42.73	10.0	55.61	17.51	10.0	17.78	21.47
10.9	38.65	38.84	10.9	41.02	45.11	10.9	30.79	42.45	10.9	55.65	17.24	11.0	17.73	21.12
11.9	38.73	38.52	11.9	41.03	44.77	11.9	30.89	42.15	11.9	55.69	16.97	11.9	17.69	20.78
12.9	38.81	38.20	12.9	41.04	44.43	12.9	30.98	41.84	12.9	55.72	16.66	12.9	17.68	20.46
13.9	38.89	37.91	13.9	41.07	44.11	13.9	31.08	41.52	13.9	55.75	16.35	13.9	17.68	20.16
14.9	38.98	37.63	14.9	41.09	43.79	14.9	31.17	41.19	14.9	55.78	16.04	14.9	17.68	19.86
15.9	39.06	37.36	15.9	41.11	43.51	15.9	31.29	40.85	15.9	55.82	15.71	15.9	17.69	19.58
16.9	39.15	37.09	16.9	41.13	43.22	16.9	31.43	40.50	16.9	55.86	15.38	16.9	17.70	19.31
17.9	39.23	36.83	17.9	41.16	42.95	17.9	31.60	40.14	17.9	55.91	15.02	17.9	17.71	19.03
18.9	39.30	36.58	18.9	41.17	42.68	18.9	31.79	39.81	18.9	56.00	14.68	18.9	17.70	18.76
19.9	39.38	36.30	19.9	41.18	42.38	19.9	32.02	39.46	19.9	56.09	14.35	19.9	17.67	18.49
20.9	39.45	36.02	20.9	41.19	42.07	20.9	32.28	39.13	20.9	56.18	14.03	20.9	17.64	18.21
21.9	39.53	35.72	21.9	41.22	41.76	21.9	32.54	38.81	21.9	56.27	13.72	21.9	17.61	17.89
22.9	39.61	35.41	22.9	41.24	41.43	22.9	32.81	38.54	22.9	56.37	13.43	22.9	17.60	17.57
23.9	39.70	35.09	23.9	41.26	41.07	23.9	33.06	38.27	23.9	56.47	13.17	23.9	17.59	17.22
24.9	39.82	34.77	24.9	41.29	40.73	24.9	33.29	38.00	24.9	56.56	12.91	24.9	17.62	16.88
25.9	39.94	34.48	25.9	41.33	40.40	25.9	33.51	37.74	25.9	56.64	12.65	25.9	17.66	16.53
26.9	40.07	34.20	26.9	41.38	40.07	26.9	33.70	37.45	26.9	56.71	12.37	26.9	17.75	16.20
27.9	40.22	33.95	27.9	41.43	39.76	27.9	33.88	37.14	27.9	56.78	12.07	27.9	17.85	15.91
28.9	40.35	33.71	28.9	41.48	39.48	28.9	34.07	36.83	28.9	56.85	11.75	28.9	17.95	15.62
29.9	40.49	33.48	29.9	41.53	39.22	29.9	34.29	36.50	29.9	56.92	11.42	29.9	18.05	15.36
30.9	40.62	33.25	30.9	41.58	38.96	30.9	34.55	36.15	30.9	57.01	11.07	30.9	18.14	15.10
31.9	40.73	33.05	31.9	41.63	38.70	31.9	34.85	35.81	31.9	57.13	10.73	31.9	18.22	14.85
1.09	-11.05		6.21	-6.13		20.31	+20.29		7.73	+7.67		18.52	-18.50	
5 ^h 46 ^m	3 ^s .075		6 ^h 46 ^m	53 ^s .600		7 ^h 2 ^m	33 ^s .206		7 ^h 13 ^m	55 ^s .106		7 ^h 16 ^m	0 ^s .004	
4° 49'	45''.59		-80° 43'	42''.15		+87° 10'	49''.32		+82° 34'	23''.73		-86° 54'	13''.24	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleonis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
July	8 16	+88 52	July	9 8	-85 20	July	9 25	+81 41	July	9 36	-80 34	July	10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
1.1	32.25	47.09	1.1	30.88	38.30	1.1	30.39	25.49	1.1	14.04	51.94	1.2	11.84	36.95
2.1	31.87	46.76	2.1	30.74	38.10	2.1	30.29	25.22	2.1	13.96	51.75	2.2	11.69	36.73
3.1	31.56	46.39	3.1	30.60	37.92	3.1	30.21	24.94	3.1	13.89	51.58	3.2	11.56	36.47
4.1	31.34	46.02	4.1	30.43	37.74	4.1	30.14	24.61	4.1	13.81	51.42	4.1	11.43	36.19
5.1	31.21	45.64	5.1	30.27	37.57	5.1	30.09	24.28	5.1	13.73	51.26	5.1	11.33	35.92
6.1	31.16	45.27	6.1	30.09	37.38	6.1	30.05	23.95	6.1	13.64	51.10	6.1	11.23	35.64
7.1	31.17	44.94	7.1	29.91	37.17	7.1	30.01	23.65	7.1	13.55	50.92	7.1	11.15	35.36
8.0	31.20	44.61	8.1	29.72	36.94	8.1	29.98	23.36	8.1	13.46	50.72	8.1	11.07	35.09
9.0	31.22	44.29	9.1	29.54	36.68	9.1	29.95	23.08	9.1	13.36	50.49	9.1	10.99	34.85
10.0	31.20	44.00	10.1	29.36	36.42	10.1	29.92	22.81	10.1	13.27	50.25	10.1	10.92	34.61
11.0	31.14	43.70	11.1	29.22	36.14	11.1	29.88	22.55	11.1	13.18	49.98	11.1	10.83	34.37
12.0	31.04	43.39	12.1	29.06	35.87	12.1	29.83	22.29	12.1	13.09	49.71	12.1	10.73	34.14
13.0	30.91	43.08	13.1	28.93	35.59	13.1	29.77	22.02	13.1	13.03	49.44	13.1	10.63	33.90
14.0	30.76	42.75	14.1	28.82	35.31	14.1	29.71	21.74	14.1	12.97	49.19	14.1	10.52	33.66
15.0	30.63	42.41	15.1	28.71	35.05	15.1	29.66	21.45	15.1	12.91	48.94	15.1	10.41	33.39
16.0	30.53	42.06	16.1	28.61	34.81	16.1	29.60	21.13	16.1	12.85	48.70	16.1	10.30	33.13
17.0	30.47	41.70	17.1	28.52	34.57	17.1	29.55	20.81	17.1	12.79	48.45	17.1	10.19	32.85
18.0	30.47	41.32	18.1	28.42	34.34	18.1	29.50	20.48	18.1	12.73	48.23	18.1	10.10	32.55
19.0	30.53	40.94	19.1	28.31	34.10	19.1	29.46	20.14	19.1	12.67	48.00	19.1	10.01	32.23
20.0	30.70	40.57	20.1	28.20	33.86	20.1	29.46	19.78	20.1	12.61	47.77	20.1	9.94	31.91
21.0	30.93	40.20	21.0	28.07	33.61	21.1	29.44	19.43	21.1	12.55	47.54	21.1	9.88	31.59
22.0	31.21	39.85	22.0	27.94	33.35	22.1	29.44	19.09	22.1	12.47	47.30	22.1	9.83	31.27
23.0	31.51	39.52	23.0	27.81	33.08	23.1	29.45	18.77	23.1	12.40	47.03	23.1	9.79	30.95
24.0	31.81	39.21	24.0	27.68	32.77	24.1	29.45	18.47	24.1	12.34	46.77	24.1	9.75	30.65
25.0	32.06	38.90	25.0	27.58	32.45	25.1	29.44	18.18	25.1	12.28	46.46	25.1	9.70	30.38
26.0	32.25	38.58	26.0	27.48	32.13	26.0	29.44	17.89	26.1	12.22	46.15	26.1	9.65	30.10
26.9	32.38	38.26	27.0	27.40	31.81	27.0	29.41	17.60	27.1	12.17	45.86	27.1	9.57	29.82
27.9	32.49	37.94	28.0	27.35	31.52	28.0	29.38	17.28	28.0	12.12	45.56	28.1	9.49	29.54
28.9	32.61	37.58	29.0	27.31	31.23	29.0	29.35	16.95	29.0	12.08	45.27	29.1	9.42	29.22
29.9	32.77	37.21	30.0	27.27	30.96	30.0	29.34	16.59	30.0	12.07	44.98	30.1	9.34	28.89
30.9	33.01	36.82	31.0	27.24	30.70	31.0	29.32	16.20	31.0	12.04	44.73	31.1	9.28	28.52
31.9	33.32	36.42	32.0	27.19	30.45	32.0	29.32	15.82	32.0	12.01	44.49	32.1	9.22	28.15
51.09	+51.08		12.32	-12.28		6.92	+6.85		6.11	-6.03		8.18	+8.12	
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
+88° 52' 49".08			-85° 20' 12".12			+81° 41' 25".82			-80° 34' 23".04			+82° 58' 35".87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1673. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
sh. no.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "
ly	10 59	−84 9	July	12 14	+88 9	July	12 46	−84 41	July	12 48	+83 51	July	13 27	−85 22
1.2	50.38	45.22	1.2	21.97	19.83	1.3	20.17	18.35	1.3	31.00	35.17	1.3	36.70	35.60
2.2	50.23	45.14	2.2	21.23	19.75	2.3	19.99	18.39	2.3	30.77	35.14	2.3	36.51	35.69
3.2	50.08	45.06	3.2	20.50	19.63	3.2	19.81	18.44	3.3	30.55	35.10	3.3	36.32	35.78
4.2	49.91	45.00	4.2	19.76	19.50	4.2	19.65	18.50	4.2	30.34	35.04	4.3	36.14	35.88
5.2	49.74	44.95	5.2	19.07	19.35	5.2	19.47	18.57	5.2	30.12	34.95	5.3	35.96	36.00
6.2	49.57	44.89	6.2	18.43	19.17	6.2	19.29	18.65	6.2	29.93	34.85	6.3	35.76	36.13
7.2	49.38	44.81	7.2	17.82	19.00	7.2	19.09	18.71	7.2	29.74	34.74	7.3	35.54	36.26
8.2	49.19	44.72	8.2	17.25	18.84	8.2	18.87	18.77	8.2	29.57	34.62	8.3	35.30	36.36
9.2	49.00	44.59	9.2	16.70	18.69	9.2	18.63	18.81	9.2	29.40	34.51	9.3	35.04	36.47
10.2	48.80	44.46	10.2	16.17	18.54	10.2	18.40	18.82	10.2	29.23	34.42	10.3	34.78	36.55
11.2	48.61	44.32	11.2	15.62	18.41	11.2	18.16	18.82	11.2	29.06	34.34	11.3	34.51	36.60
12.2	48.42	44.15	12.2	15.03	18.29	12.2	17.94	18.80	12.2	28.88	34.26	12.3	34.25	36.64
13.1	48.25	43.97	13.2	14.43	18.16	13.2	17.71	18.75	13.2	28.69	34.19	13.3	34.00	36.66
14.1	48.08	43.79	14.2	13.80	18.04	14.2	17.52	18.70	14.2	28.50	34.13	14.2	33.76	36.67
15.1	47.94	43.61	15.2	13.15	17.90	15.2	17.31	18.66	15.2	28.30	34.07	15.2	33.52	36.67
16.1	47.79	43.45	16.2	12.49	17.73	16.2	17.12	18.60	16.2	28.08	33.96	16.2	33.30	36.66
17.1	47.65	43.30	17.2	11.83	17.57	17.2	16.94	18.56	17.2	27.87	33.85	17.2	33.08	36.66
18.1	47.51	43.15	18.2	11.16	17.40	18.2	16.75	18.53	18.2	27.67	33.72	18.2	32.89	36.69
19.1	47.38	43.00	19.2	10.51	17.18	19.2	16.58	18.50	19.2	27.47	33.59	19.2	32.67	36.71
20.1	47.23	42.86	20.2	9.91	16.95	20.2	16.40	18.49	20.2	27.28	33.41	20.2	32.46	36.76
21.1	47.08	42.71	21.2	9.35	16.72	21.2	16.20	18.48	21.2	27.10	33.23	21.2	32.24	36.80
22.1	46.91	42.55	22.2	8.82	16.48	22.2	15.99	18.47	22.2	26.93	33.04	22.2	32.00	36.84
23.1	46.74	42.37	23.2	8.33	16.25	23.2	15.77	18.44	23.2	26.77	32.84	23.2	31.75	36.87
24.1	46.57	42.19	24.2	7.86	16.02	24.2	15.54	18.40	24.2	26.61	32.66	24.2	31.48	36.87
25.1	46.40	41.97	25.2	7.38	15.80	25.2	15.31	18.32	25.2	26.45	32.52	25.2	31.21	36.87
26.1	46.25	41.74	26.2	6.89	15.61	26.2	15.09	18.24	26.2	26.29	32.36	26.2	30.93	36.84
27.1	46.10	41.50	27.2	6.35	15.42	27.2	14.87	18.11	27.2	26.12	32.21	27.2	30.69	36.79
28.1	45.97	41.27	28.2	5.79	15.23	28.2	14.67	17.98	28.2	25.93	32.06	28.2	30.44	36.71
29.1	45.85	41.04	29.2	5.19	15.02	29.2	14.49	17.85	29.2	25.74	31.91	29.2	30.21	36.63
30.1	45.75	40.82	30.2	4.57	14.80	30.2	14.31	17.75	30.2	25.54	31.75	30.2	30.02	36.57
31.1	45.65	40.63	31.2	3.95	14.54	31.2	14.17	17.65	31.2	25.34	31.56	31.2	29.82	36.51
32.1	45.54	40.44	32.1	3.38	14.26	32.2	14.01	17.56	32.2	25.15	31.33	32.2	29.63	36.46
9.83	−9.78		31.06	+31.04		10.80	−10.76		9.35	+9.30		12.41	−12.37	
0 ^h 59 ^m	54 ^s .915		12 ^h 14 ^m	28 ^s .804		12 ^h 46 ^m	13 ^s .131		12 ^h 48 ^m	30 ^s .862		13 ^h 27 ^m	23 ^s .749	
4° 9'	9''.97		+88° 9'	16''.14		−84° 40'	41''.95		+83° 51'	30''.88		−85° 22'	0''.86	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m 14 13	° ' " -83 18	July	h m 15 3	° ' " +87 33	July	h m 15 24	° ' " -84 12	July	h m 16 54	° ' " +82 10	July	h m 17 16	° ' " -80 47
	s "	"		s "	"		s "	"		s "	"		s "	"
1.3	50.64	9.17	1.4	22.92	2.39	1.4	31.03	6.98	1.4	22.80	32.77	1.4	23.63	18.48
2.3	50.52	9.29	2.3	22.42	2.57	2.4	30.93	7.17	2.4	22.71	33.10	2.4	23.62	18.71
3.3	50.41	9.42	3.3	21.89	2.75	3.4	30.84	7.36	3.4	22.60	33.42	3.4	23.61	18.94
4.3	50.31	9.57	4.3	21.34	2.89	4.4	30.76	7.58	4.4	22.50	33.72	4.4	23.62	19.18
5.3	50.20	9.74	5.3	20.80	3.00	5.4	30.67	7.80	5.4	22.38	33.99	5.4	23.62	19.46
6.3	50.07	9.91	6.3	20.28	3.10	6.4	30.58	8.04	6.4	22.27	34.23	6.4	23.62	19.73
7.3	49.95	10.09	7.3	19.77	3.18	7.3	30.47	8.29	7.4	22.16	34.46	7.4	23.62	20.01
8.3	49.82	10.26	8.3	19.28	3.25	8.3	30.35	8.53	8.4	22.05	34.69	8.4	23.61	20.33
9.3	49.65	10.42	9.3	18.82	3.32	9.3	30.21	8.76	9.4	21.94	34.91	9.4	23.58	20.63
10.3	49.48	10.56	10.3	18.37	3.40	10.3	30.06	8.99	10.4	21.84	35.13	10.4	23.54	20.92
11.3	49.32	10.65	11.3	17.92	3.48	11.3	29.89	9.18	11.4	21.74	35.35	11.4	23.50	21.20
12.3	49.14	10.74	12.3	17.46	3.57	12.3	29.73	9.36	12.4	21.64	35.59	12.4	23.45	21.47
13.3	48.97	10.82	13.3	16.99	3.68	13.3	29.56	9.51	13.4	21.53	35.84	13.4	23.40	21.72
14.3	48.82	10.88	14.3	16.50	3.79	14.3	29.40	9.65	14.4	21.42	36.11	14.4	23.34	21.96
15.3	48.67	10.94	15.3	15.99	3.91	15.3	29.25	9.79	15.4	21.30	36.37	15.4	23.28	22.17
16.3	48.52	10.99	16.3	15.45	4.02	16.3	29.11	9.94	16.4	21.18	36.62	16.4	23.23	22.39
17.3	48.38	11.04	17.3	14.90	4.11	17.3	28.97	10.06	17.4	21.06	36.87	17.4	23.19	22.60
18.3	48.25	11.11	18.3	14.34	4.18	18.3	28.83	10.20	18.4	20.92	37.12	18.4	23.15	22.82
19.3	48.11	11.19	19.3	13.76	4.23	19.3	28.71	10.34	19.4	20.79	37.36	19.4	23.11	23.05
20.3	47.98	11.27	20.3	13.19	4.27	20.3	28.58	10.51	20.4	20.65	37.58	20.4	23.08	23.28
21.3	47.83	11.37	21.3	12.62	4.29	21.3	28.44	10.69	21.4	20.50	37.77	21.4	23.04	23.54
22.3	47.69	11.47	22.3	12.09	4.29	22.3	28.29	10.88	22.4	20.36	37.95	22.4	23.00	23.80
23.3	47.52	11.56	23.3	11.57	4.28	23.3	28.13	11.06	23.4	20.22	38.10	23.4	22.95	24.07
24.3	47.34	11.62	24.3	11.07	4.28	24.3	27.96	11.24	24.4	20.09	38.25	24.4	22.91	24.34
25.3	47.16	11.68	25.3	10.59	4.28	25.3	27.77	11.39	25.4	19.96	38.41	25.4	22.83	24.60
26.2	46.99	11.69	26.3	10.10	4.31	26.3	27.58	11.50	26.4	19.83	38.60	26.4	22.75	24.83
27.2	46.81	11.70	27.3	9.60	4.34	27.3	27.39	11.60	27.4	19.70	38.80	27.4	22.66	25.05
28.2	46.64	11.69	28.3	9.07	4.39	28.3	27.20	11.68	28.4	19.57	39.01	28.4	22.57	25.24
29.2	46.48	11.67	29.3	8.52	4.43	29.3	27.03	11.74	29.4	19.42	39.23	29.4	22.49	25.42
30.2	46.33	11.66	30.3	7.92	4.46	30.3	26.87	11.80	30.3	19.27	39.44	30.4	22.43	25.59
31.2	46.20	11.65	31.3	7.31	4.47	31.3	26.72	11.88	31.3	19.12	39.64	31.4	22.37	25.75
32.2	46.07	11.65	32.3	6.70	4.45	32.3	26.58	11.96	32.3	18.95	39.83	32.4	22.31	25.92
8.58 -8.52			23.40 +23.38			9.90 -9.85			7.35 +7.28			6.25 -6.17		
14 ^h 13 ^m 37 ^s .066			15 ^h 3 ^m 21 ^s .809			15 ^h 24 ^m 9 ^s .966			16 ^h 54 ^m 19 ^s .238			17 ^h 16 ^m 6 ^s .064		
-83° 17' 37''.78			+87° 32' 56''.60			-84° 11' 42''.92			+82° 10' 27''.09			-80° 47' 10''.43		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
July	17 58	+86 36	July	18 7	-87 39	July	19 1	+89 1	July	19 32	-89 13	July	20 48	+82 13
	s	"		s	"		s	"		s	"		s	"
1.5	48.13	56.08	1.5	50.84	51.55	1.5	47.40	11.37	1.5	9.66	7.98	1.6	41.79	45.04
2.5	48.01	56.44	2.5	50.87	51.81	2.5	47.35	11.75	2.5	10.16	8.22	2.6	41.88	45.40
3.5	47.87	56.80	3.5	50.90	52.06	3.5	47.21	12.12	3.5	10.70	8.45	3.6	41.95	45.78
4.5	47.69	57.16	4.5	50.97	52.32	4.5	46.96	12.50	4.5	11.34	8.69	4.6	42.03	46.15
5.5	47.51	57.49	5.5	51.06	52.58	5.5	46.64	12.87	5.5	12.03	8.94	5.6	42.08	46.53
6.5	47.31	57.81	6.5	51.14	52.89	6.5	46.25	13.21	6.5	12.77	9.21	6.6	42.14	46.92
7.5	47.11	58.10	7.5	51.19	53.20	7.5	45.84	13.54	7.5	13.48	9.49	7.6	42.17	47.26
8.5	46.91	58.38	8.5	51.22	53.52	8.5	45.45	13.84	8.5	14.12	9.79	8.6	42.20	47.59
9.5	46.72	58.64	9.5	51.22	53.86	9.5	45.07	14.14	9.5	14.67	10.10	9.6	42.24	47.91
10.4	46.55	58.90	10.5	51.17	54.20	10.5	44.75	14.43	10.5	15.12	10.42	10.6	42.28	48.23
11.4	46.38	59.17	11.5	51.08	54.53	11.5	44.47	14.75	11.5	15.44	10.75	11.6	42.31	48.53
12.4	46.22	59.44	12.4	50.97	54.83	12.5	44.23	15.05	12.5	15.67	11.08	12.6	42.36	48.85
13.4	46.06	59.74	13.4	50.85	55.12	13.5	43.97	15.36	13.5	15.83	11.38	13.6	42.40	49.18
14.4	45.89	60.05	14.4	50.72	55.40	14.5	43.71	15.69	14.5	15.95	11.67	14.6	42.45	49.52
15.4	45.71	60.37	15.4	50.58	55.67	15.5	43.41	16.02	15.5	16.05	11.96	15.6	42.50	49.88
16.4	45.52	60.69	16.4	50.45	55.93	16.5	43.05	16.39	16.5	16.16	12.23	16.5	42.54	50.25
17.4	45.30	61.01	17.4	50.34	56.17	17.5	42.65	16.75	17.5	16.30	12.51	17.5	42.58	50.63
18.4	45.07	61.32	18.4	50.26	56.43	18.5	42.16	17.11	18.5	16.48	12.77	18.5	42.62	51.02
19.4	44.81	61.61	19.4	50.18	56.69	19.5	41.58	17.45	19.5	16.71	13.03	19.5	42.65	51.40
20.4	44.54	61.90	20.4	50.10	56.96	20.5	40.95	17.79	20.5	16.99	13.30	20.5	42.66	51.79
21.4	44.26	62.17	21.4	50.04	57.24	21.5	40.27	18.12	21.5	17.28	13.58	21.5	42.67	52.17
22.4	43.98	62.42	22.4	49.96	57.55	22.5	39.56	18.42	22.5	17.57	13.89	22.5	42.66	52.54
23.4	43.70	62.65	23.4	49.84	57.87	23.5	38.85	18.70	23.5	17.79	14.20	23.5	42.65	52.88
24.4	43.43	62.87	24.4	49.69	58.18	24.5	38.18	18.98	24.5	17.92	14.54	24.5	42.65	53.22
25.4	43.19	63.09	25.4	49.50	58.48	25.5	37.55	19.25	25.5	17.91	14.86	25.5	42.65	53.56
26.4	42.95	63.32	26.4	49.27	58.77	26.4	36.99	19.52	26.5	17.78	15.19	26.5	42.66	53.88
27.4	42.71	63.58	27.4	49.01	59.05	27.4	36.45	19.83	27.5	17.55	15.50	27.5	42.66	54.22
28.4	42.47	63.85	28.4	48.76	59.29	28.4	35.91	20.14	28.5	17.26	15.79	28.5	42.67	54.58
29.4	42.20	64.14	29.4	48.52	59.51	29.4	35.33	20.47	29.5	16.97	16.07	29.5	42.69	54.95
30.4	41.93	64.44	30.4	48.29	59.73	30.4	34.66	20.84	30.5	16.73	16.33	30.5	42.70	55.36
31.4	41.62	64.73	31.4	48.09	59.95	31.4	33.90	21.19	31.5	16.56	16.58	31.5	42.70	55.77
32.4	41.29	65.00	32.4	47.92	60.18	32.4	33.04	21.52	32.5	16.45	16.84	32.5	42.69	56.17
16.95 +16.92			24.55 -24.53			58.53 +58.53			73.46 -73.45			7.40 +7.33		
17 ^h 58 ^m 41 ^s .809			18 ^h 6 ^m 47 ^s .620			19 ^h 1 ^m 27 ^s .463			19 ^h 29 ^m 16 ^s .746			20 ^h 48 ^m 36 ^s .323		
+86° 36' 51".12			-87° 39' 51".38			+89° 1' 7".53			-89° 13' 21".02			+82° 13' 43".34		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ ¹ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m 21 38	° ' " -83 5	July	h m 22 16	° ' " -86 22	July	h m 22 37	° ' " -81 48	July	h m 23 27	° ' " +86 51	July	h m 23 47	° ' " -82 27
	s "	"		s "	"		s "	"		s "	"		s "	"
1.6	44.15	21.14	1.7	41.92	36.16	1.7	54.59	9.32	1.7	52.95	16.33	1.7	24.37	51.46
2.6	44.27	21.28	2.6	42.17	36.27	2.7	54.71	9.39	2.7	53.37	16.51	2.7	24.51	51.46
3.6	44.41	21.41	3.6	42.44	36.37	3.7	54.84	9.45	3.7	53.78	16.71	3.7	24.65	51.46
4.6	44.55	21.53	4.6	42.72	36.46	4.7	54.97	9.49	4.7	54.18	16.93	4.7	24.80	51.43
5.6	44.70	21.65	5.6	43.03	36.55	5.7	55.11	9.54	5.7	54.56	17.15	5.7	24.97	51.40
6.6	44.87	21.79	6.6	43.34	36.66	6.7	55.26	9.61	6.7	54.90	17.39	6.7	25.14	51.37
7.6	45.04	21.95	7.6	43.66	36.79	7.6	55.42	9.69	7.7	55.23	17.62	7.7	25.33	51.35
8.6	45.20	22.13	8.6	44.00	36.93	8.6	55.58	9.80	8.7	55.52	17.85	8.7	25.51	51.35
9.6	45.35	22.32	9.6	44.32	37.10	9.6	55.74	9.92	9.7	55.81	18.06	9.7	25.69	51.38
10.6	45.50	22.53	10.6	44.62	37.27	10.6	55.88	10.05	10.7	56.11	18.26	10.7	25.87	51.43
11.6	45.63	22.76	11.6	44.91	37.46	11.6	56.03	10.21	11.7	56.41	18.45	11.7	26.03	51.50
12.6	45.74	22.99	12.6	45.17	37.67	12.6	56.15	10.38	12.7	56.72	18.64	12.7	26.19	51.59
13.6	45.85	23.22	13.6	45.41	37.87	13.6	56.27	10.55	13.7	57.05	18.82	13.7	26.34	51.68
14.6	45.95	23.44	14.6	45.63	38.06	14.6	56.38	10.71	14.7	57.39	19.02	14.7	26.49	51.76
15.6	46.05	23.65	15.6	45.85	38.24	15.6	56.49	10.88	15.7	57.74	19.24	15.7	26.62	51.84
16.6	46.15	23.85	16.6	46.06	38.43	16.6	56.59	11.03	16.7	58.08	19.47	16.7	26.76	51.93
17.6	46.25	24.05	17.6	46.28	38.61	17.6	56.70	11.17	17.7	58.43	19.73	17.7	26.89	52.01
18.6	46.35	24.24	18.6	46.50	38.78	18.6	56.82	11.31	18.7	58.78	20.00	18.7	27.04	52.07
19.6	46.46	24.43	19.6	46.73	38.94	19.6	56.94	11.44	19.7	59.12	20.28	19.7	27.18	52.13
20.6	46.59	24.62	20.6	46.98	39.11	20.6	57.06	11.58	20.6	59.42	20.57	20.7	27.33	52.20
21.6	46.72	24.83	21.6	47.25	39.28	21.6	57.20	11.72	21.6	59.70	20.86	21.7	27.49	52.27
22.6	46.84	25.05	22.6	47.52	39.46	22.6	57.33	11.88	22.6	59.96	21.15	22.7	27.66	52.35
23.6	46.96	25.28	23.6	47.79	39.68	23.6	57.46	12.05	23.6	60.20	21.44	23.7	27.83	52.44
24.6	47.08	25.53	24.6	48.04	39.90	24.6	57.59	12.25	24.6	60.43	21.72	24.7	28.00	52.55
25.6	47.18	25.80	25.6	48.28	40.16	25.6	57.70	12.46	25.6	60.66	21.99	25.6	28.16	52.68
26.6	47.27	26.08	26.6	48.49	40.42	26.6	57.81	12.68	26.6	60.92	22.25	26.6	28.31	52.85
27.6	47.34	26.36	27.6	48.68	40.67	27.6	57.91	12.92	27.6	61.19	22.51	27.6	28.44	53.01
28.6	47.40	26.63	28.6	48.83	40.92	28.6	58.00	13.14	28.6	61.48	22.77	28.6	28.57	53.17
29.5	47.45	26.88	29.6	48.97	41.16	29.6	58.07	13.34	29.6	61.79	23.04	29.6	28.69	53.32
30.5	47.51	27.12	30.6	49.12	41.39	30.6	58.16	13.54	30.6	62.10	23.35	30.6	28.80	53.47
31.5	47.58	27.34	31.6	49.28	41.59	31.6	58.24	13.72	31.6	62.39	23.67	31.6	28.91	53.60
32.5	47.66	27.56	32.6	49.45	41.78	32.6	58.33	13.90	32.6	62.68	23.99	32.6	29.03	53.71
8.31 -8.25			15.83 -15.79			7.01 -6.94			18.23 +18.20			7.63 -7.56		
21 ^h 38 ^m 29 ^s .050			22 ^h 16 ^m 20 ^s .949			22 ^h 37 ^m 45 ^s .323			23 ^h 27 ^m 43 ^s .851			23 ^h 47 ^m 20 ^s .032		
-83° 5' 50''.66			-86° 23' 9''.03			-81° 48' 43''.57			+86° 51' 18''.76			-82° 28' 28''.42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m 0 57	° ' " +85 49	Aug.	h m 1 31	° ' " +88 51	Aug.	h m 1 41	° ' " -85 10	Aug.	h m 4 10	° ' " +85 20	Aug.	h m 5 35	° ' " +85 9
	s	"		s	"		s	"		s	"		s	"
0.7	32.36	4.52	0.7	30.55	59.55	0.7	56.69	27.20	0.8	30.16	9.48	0.9	37.77	19.82
1.7	32.68	4.75	1.7	31.77	59.73	1.7	56.91	27.20	1.8	30.49	9.41	1.9	38.04	19.61
2.7	32.97	4.99	2.7	32.93	59.93	2.7	57.14	27.20	2.8	30.83	9.35	2.9	38.32	19.41
3.7	33.25	5.25	3.7	34.01	60.15	3.7	57.39	27.19	3.8	31.15	9.32	3.9	38.60	19.25
4.7	33.50	5.50	4.7	35.01	60.36	4.7	57.65	27.19	4.8	31.45	9.30	4.9	38.87	19.10
5.7	33.74	5.75	5.7	35.97	60.56	5.7	57.91	27.22	5.8	31.74	9.29	5.9	39.12	18.96
6.7	33.96	5.98	6.7	36.90	60.76	6.7	58.18	27.26	6.8	32.01	9.27	6.9	39.35	18.83
7.7	34.20	6.22	7.7	37.83	60.94	7.7	58.45	27.32	7.8	32.29	9.24	7.9	39.59	18.68
8.7	34.43	6.45	8.7	38.79	61.10	8.7	58.71	27.41	8.8	32.56	9.19	8.9	39.82	18.51
9.7	34.67	6.65	9.7	39.76	61.27	9.7	58.95	27.51	9.8	32.83	9.14	9.8	40.04	18.35
10.7	34.92	6.87	10.7	40.78	61.44	10.7	59.18	27.64	10.8	33.11	9.09	10.8	40.27	18.18
11.7	35.19	7.09	11.7	41.85	61.61	11.7	59.41	27.77	11.8	33.40	9.02	11.8	40.51	17.98
12.6	35.46	7.32	12.7	42.93	61.79	12.7	59.62	27.88	12.8	33.71	8.97	12.8	40.76	17.80
13.6	35.73	7.56	13.7	44.05	62.00	13.7	59.83	27.99	13.8	34.02	8.92	13.8	41.03	17.63
14.6	36.01	7.83	14.7	45.15	62.22	14.7	60.04	28.10	14.8	34.34	8.88	14.8	41.31	17.45
15.6	36.28	8.12	15.7	46.25	62.44	15.7	60.24	28.19	15.8	34.68	8.86	15.8	41.61	17.29
16.6	36.55	8.42	16.7	47.32	62.68	16.7	60.45	28.28	16.8	35.02	8.86	16.8	41.92	17.15
17.6	36.79	8.73	17.7	48.33	62.95	17.7	60.67	28.37	17.8	35.36	8.89	17.8	42.23	17.03
18.6	37.01	9.05	18.7	49.29	63.23	18.7	60.90	28.45	18.8	35.70	8.93	18.8	42.53	16.92
19.6	37.22	9.36	19.7	50.17	63.51	19.7	61.14	28.54	19.8	36.01	8.99	19.8	42.83	16.83
20.6	37.41	9.65	20.6	51.01	63.77	20.7	61.39	28.65	20.8	36.31	9.05	20.8	43.12	16.76
21.6	37.60	9.94	21.6	51.81	64.02	21.7	61.63	28.78	21.8	36.60	9.11	21.8	43.39	16.69
22.6	37.79	10.22	22.6	52.63	64.26	22.7	61.87	28.94	22.8	36.87	9.13	22.8	43.64	16.59
23.6	38.00	10.49	23.6	53.49	64.48	23.6	62.09	29.12	23.8	37.15	9.13	23.8	43.89	16.49
24.6	38.22	10.76	24.6	54.40	64.70	24.6	62.29	29.30	24.8	37.45	9.14	24.8	44.16	16.37
25.6	38.44	11.03	25.6	55.38	64.94	25.6	62.49	29.49	25.7	37.76	9.14	25.8	44.43	16.23
26.6	38.69	11.30	26.6	56.42	65.19	26.6	62.66	29.68	26.7	38.08	9.14	26.8	44.72	16.08
27.6	38.93	11.62	27.6	57.46	65.45	27.6	62.82	29.86	27.7	38.43	9.17	27.8	45.04	15.95
28.6	39.17	11.97	28.6	58.48	65.75	28.6	62.99	30.02	28.7	38.78	9.21	28.8	45.38	15.85
29.6	39.41	12.33	29.6	59.45	66.07	29.6	63.17	30.17	29.7	39.13	9.26	29.8	45.72	15.74
30.6	39.61	12.69	30.6	60.32	66.37	30.6	63.37	30.32	30.7	39.47	9.35	30.8	46.04	15.69
31.6	39.79	13.05	31.6	61.13	66.69	31.6	63.58	30.47	31.7	39.80	9.46	31.8	46.36	15.64
13.72 +13.68			50.59 +50.58			11.89 -11.85			12.30 +12.26			11.84 +11.80		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .554		
+85° 49' 4''.72			+88° 52' 2''.06			-85° 11' 3''.34			+85° 20' 19''.62			+85° 9' 32''.39		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

81 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Aug.	5 45	-84 49	Aug.	6 46	-80 43	Aug.	7 2	+87 10	Aug.	7 13	+82 34	Aug.	7 15	-86 54
	s	"		s	"		s	"		s	"		s	"
0.9	40.73	33.05	0.9	41.63	38.70	0.9	34.85	35.81	0.9	57.13	10.73	0.9	18.22	14.85
1.9	40.85	32.82	1.9	41.67	38.44	1.9	35.17	35.49	1.9	57.25	10.40	1.9	18.28	14.59
2.9	40.97	32.56	2.9	41.71	38.16	2.9	35.51	35.20	2.9	57.39	10.10	2.9	18.34	14.31
3.9	41.09	32.30	3.9	41.76	37.87	3.9	35.86	34.91	3.9	57.52	9.82	3.9	18.40	14.01
4.9	41.22	32.03	4.9	41.81	37.56	4.9	36.20	34.66	4.9	57.65	9.57	4.9	18.48	13.70
5.9	41.37	31.75	5.9	41.86	37.24	5.9	36.53	34.42	5.9	57.78	9.33	5.9	18.58	13.37
6.9	41.54	31.49	6.9	41.93	36.92	6.9	36.83	34.17	6.9	57.87	9.09	6.9	18.71	13.05
7.9	41.71	31.23	7.9	42.01	36.61	7.9	37.11	33.92	7.9	57.98	8.83	7.9	18.85	12.72
8.9	41.89	31.00	8.9	42.08	36.30	8.9	37.39	33.66	8.9	58.08	8.57	8.9	19.03	12.41
9.9	42.07	30.78	9.9	42.15	36.02	9.9	37.66	33.39	9.9	58.18	8.31	9.9	19.22	12.13
10.9	42.25	30.59	10.9	42.23	35.76	10.9	37.93	33.12	10.9	58.28	8.04	10.9	19.41	11.84
11.9	42.44	30.40	11.9	42.31	35.51	11.9	38.22	32.84	11.9	58.39	7.76	11.9	19.61	11.57
12.8	42.62	30.22	12.9	42.40	35.27	12.9	38.53	32.55	12.9	58.51	7.47	12.9	19.80	11.34
13.8	42.80	30.04	13.9	42.47	35.04	13.9	38.86	32.25	13.9	58.63	7.17	13.9	19.99	11.10
14.8	42.97	29.87	14.9	42.56	34.83	14.9	39.21	31.95	14.9	58.76	6.86	14.9	20.18	10.88
15.8	43.14	29.70	15.9	42.63	34.60	15.9	39.59	31.67	15.9	58.89	6.58	15.9	20.36	10.65
16.8	43.31	29.52	16.9	42.72	34.37	16.9	40.00	31.39	16.9	59.06	6.30	16.9	20.52	10.38
17.8	43.48	29.32	17.9	42.79	34.13	17.9	40.42	31.15	17.9	59.23	6.06	17.9	20.68	10.13
18.8	43.64	29.12	18.9	42.86	33.86	18.9	40.86	30.92	18.9	59.39	5.81	18.9	20.85	9.86
19.8	43.82	28.90	19.9	42.94	33.59	19.9	41.27	30.70	19.9	59.54	5.58	19.9	21.02	9.57
20.8	44.01	28.69	20.9	43.02	33.32	20.9	41.69	30.49	20.9	59.69	5.38	20.9	21.22	9.28
21.8	44.22	28.49	21.9	43.12	33.05	21.9	42.06	30.31	21.9	59.84	5.18	21.9	21.44	8.99
22.8	44.44	28.31	22.9	43.22	32.80	22.9	42.42	30.09	22.9	59.97	4.96	22.9	21.70	8.72
23.8	44.66	28.17	23.9	43.32	32.57	23.9	42.77	29.87	23.9	60.10	4.74	23.9	21.96	8.47
24.8	44.89	28.03	24.9	43.42	32.37	24.9	43.12	29.64	24.9	60.23	4.49	24.9	22.24	8.24
25.8	45.10	27.92	25.9	43.53	32.19	25.9	43.48	29.38	25.9	60.37	4.22	25.9	22.53	8.04
26.8	45.30	27.82	26.9	43.64	32.02	26.9	43.88	29.12	26.9	60.51	3.95	26.9	22.80	7.85
27.8	45.50	27.72	27.8	43.75	31.86	27.9	44.32	28.85	27.9	60.68	3.67	27.9	23.06	7.67
28.8	45.69	27.62	28.8	43.84	31.70	28.9	44.77	28.60	28.9	60.86	3.41	28.9	23.30	7.49
29.8	45.88	27.52	29.8	43.94	31.54	29.9	45.25	28.36	29.9	61.04	3.16	29.9	23.54	7.30
30.8	46.08	27.39	30.8	44.03	31.35	30.9	45.74	28.16	30.9	61.23	2.94	30.9	23.77	7.08
31.8	46.27	27.26	31.8	44.13	31.13	31.8	46.22	27.98	31.9	61.41	2.75	31.9	24.01	6.84
11.09 -11.04			6.20 -6.12			20.29 +20.27			7.73 +7.67			18.51 -18.48		
5 ^h 46 ^m 3 ^s .075			6 ^h 46 ^m 53 ^s .600			7 ^h 2 ^m 33 ^s .206			7 ^h 13 ^m 55 ^s .106			7 ^h 16 ^m 0 ^s .004		
-84° 49' 45".59			-80° 43' 42".15			+87° 10' 49".32			+82° 34' 23".73			-86° 54' 13".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Ootantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamseleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m 8 16	° ' " +88 52	Aug.	h m 9 8	° ' " -85 20	Aug.	h m 9 25	° ' " +81 41	Aug.	h m 9 36	° ' " -80 34	Aug.	h m 10 21	° ' " +82 58
	s "	"		s "	"		s "	"		s "	"		s "	"
0.9	33.32	36.42	1.0	27.19	30.45	1.0	29.32	15.82	1.0	12.01	44.49	1.1	9.22	28.15
1.9	33.73	36.04	2.0	27.13	30.18	2.0	29.33	15.44	2.0	11.97	44.23	2.1	9.17	27.78
2.9	34.19	35.68	3.0	27.05	29.92	3.0	29.36	15.07	3.0	11.94	43.97	3.1	9.16	27.40
3.9	34.70	35.34	4.0	26.97	29.65	4.0	29.39	14.71	4.0	11.90	43.69	4.1	9.14	27.06
4.9	35.21	35.01	5.0	26.91	29.34	5.0	29.42	14.38	5.0	11.85	43.40	5.1	9.13	26.73
5.9	35.68	34.70	6.0	26.85	29.02	6.0	29.43	14.05	6.0	11.81	43.08	6.1	9.11	26.40
6.9	36.12	34.41	7.0	26.80	28.68	7.0	29.45	13.74	7.0	11.77	42.76	7.1	9.09	26.09
7.9	36.51	34.10	8.0	26.76	28.33	8.0	29.47	13.44	8.0	11.74	42.43	8.1	9.06	25.79
8.9	36.88	33.79	8.9	26.76	28.00	9.0	29.48	13.12	9.0	11.73	42.07	9.0	9.02	25.48
9.9	37.24	33.46	9.9	26.75	27.67	10.0	29.49	12.80	10.0	11.71	41.75	10.0	8.99	25.16
10.9	37.59	33.13	10.9	26.76	27.36	11.0	29.48	12.47	11.0	11.70	41.42	11.0	8.95	24.83
11.9	37.95	32.80	11.9	26.79	27.05	12.0	29.49	12.11	12.0	11.69	41.10	12.0	8.91	24.50
12.9	38.36	32.46	12.9	26.82	26.76	13.0	29.49	11.76	13.0	11.69	40.80	13.0	8.86	24.13
13.9	38.82	32.10	13.9	26.83	26.49	13.9	29.51	11.40	14.0	11.70	40.52	14.0	8.82	23.77
14.9	39.35	31.73	14.9	26.85	26.20	14.9	29.54	11.04	15.0	11.69	40.25	15.0	8.81	23.40
15.9	39.93	31.37	15.9	26.86	25.92	15.9	29.58	10.67	15.9	11.70	39.97	16.0	8.80	23.02
16.9	40.58	31.01	16.9	26.88	25.63	16.9	29.62	10.29	16.9	11.70	39.69	17.0	8.79	22.63
17.9	41.31	30.68	17.9	26.88	25.34	17.9	29.68	9.91	17.9	11.70	39.41	18.0	8.80	22.25
18.9	42.05	30.36	18.9	26.87	25.03	18.9	29.75	9.54	18.9	11.69	39.12	19.0	8.84	21.87
19.9	42.80	30.08	19.9	26.87	24.72	19.9	29.81	9.20	19.9	11.67	38.80	20.0	8.87	21.51
20.9	43.52	29.78	20.9	26.88	24.40	20.9	29.88	8.88	20.9	11.66	38.47	21.0	8.88	21.18
21.9	44.20	29.50	21.9	26.91	24.08	21.9	29.93	8.57	21.9	11.66	38.11	22.0	8.90	20.85
22.9	44.83	29.22	22.9	26.95	23.72	22.9	29.97	8.25	22.9	11.67	37.77	23.0	8.91	20.54
23.9	45.41	28.92	23.9	27.01	23.39	23.9	30.01	7.93	23.9	11.68	37.43	24.0	8.91	20.20
24.9	45.98	28.60	24.9	27.09	23.09	24.9	30.05	7.60	24.9	11.71	37.11	25.0	8.90	19.84
25.9	46.57	28.27	25.9	27.18	22.80	25.9	30.08	7.24	25.9	11.74	36.82	26.0	8.89	19.47
26.9	47.21	27.92	26.9	27.27	22.52	26.9	30.12	6.88	26.9	11.78	36.55	27.0	8.89	19.10
27.9	47.94	27.58	27.9	27.36	22.27	27.9	30.17	6.50	27.9	11.81	36.28	27.9	8.89	18.69
28.9	48.76	27.24	28.9	27.44	22.03	28.9	30.24	6.08	28.9	11.85	36.01	28.9	8.92	18.29
29.9	49.64	26.91	29.9	27.50	21.77	29.9	30.33	5.70	29.9	11.88	35.74	29.9	8.96	17.88
30.9	50.56	26.61	30.9	27.56	21.50	30.9	30.41	5.36	30.9	11.89	35.46	30.9	9.01	17.49
31.9	51.48	26.32	31.9	27.61	21.18	31.9	30.50	5.02	31.9	11.91	35.16	31.9	9.07	17.12
50.95	+50.94		12.31	-12.27		6.92	+6.84		6.11	-6.03		8.17	+8.11	
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
+88° 52' 49".08			-85° 20' 12".12			+81° 41' 25".82			-80° 34' 23".04			+82° 58' 35".87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

<i>η</i> Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			<i>ι</i> Octantis. Mag. 5.4			32 H. Camelop. <i>seq.</i> Mag. 5.3			<i>κ</i> Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "
	10 59	−84 9		12 13	+88 9		12 46	−84 41		12 48	+83 51		13 27	−85 22
1.1	45.54	40.44	1.1	63.38	14.26	1.2	14.01	17.56	1.2	25.15	31.33	1.2	29.63	36.46
2.1	45.44	40.25	2.1	62.85	13.97	2.2	13.84	17.48	2.2	24.97	31.09	2.2	29.41	36.43
3.1	45.31	40.06	3.1	62.36	13.66	3.2	13.66	17.39	3.2	24.81	30.84	3.2	29.20	36.40
4.1	45.17	39.84	4.1	61.90	13.37	4.2	13.46	17.30	4.2	24.66	30.59	4.2	28.97	36.37
5.1	45.04	39.62	5.1	61.49	13.08	5.2	13.24	17.20	5.2	24.52	30.34	5.2	28.71	36.32
6.1	44.90	39.36	6.1	61.10	12.81	6.2	13.02	17.07	6.2	24.38	30.12	6.2	28.44	36.24
7.1	44.76	39.10	7.1	60.69	12.55	7.2	12.82	16.93	7.2	24.24	29.89	7.2	28.17	36.15
8.1	44.64	38.82	8.1	60.28	12.31	8.2	12.62	16.75	8.2	24.09	29.66	8.2	27.93	36.02
9.1	44.54	38.52	9.1	59.84	12.06	9.1	12.42	16.57	9.2	23.95	29.46	9.2	27.68	35.90
10.1	44.44	38.23	10.1	59.38	11.81	10.1	12.23	16.37	10.1	23.78	29.26	10.2	27.44	35.76
11.1	44.35	37.93	11.1	58.90	11.55	11.1	12.05	16.17	11.1	23.62	29.05	11.2	27.21	35.61
12.1	44.27	37.65	12.1	58.40	11.29	12.1	11.89	15.97	12.1	23.44	28.83	12.2	27.00	35.45
13.1	44.21	37.38	13.1	57.90	11.01	13.1	11.74	15.78	13.1	23.27	28.61	13.2	26.80	35.31
14.1	44.15	37.14	14.1	57.39	10.70	14.1	11.59	15.60	14.1	23.10	28.35	14.2	26.61	35.17
15.1	44.07	36.89	15.1	56.92	10.40	15.1	11.45	15.44	15.1	22.93	28.08	15.2	26.42	35.04
16.1	44.00	36.65	16.1	56.49	10.08	16.1	11.30	15.29	16.1	22.79	27.80	16.2	26.23	34.92
17.1	43.92	36.40	17.1	56.07	9.75	17.1	11.15	15.14	17.1	22.65	27.49	17.2	26.04	34.82
18.0	43.85	36.14	18.1	55.71	9.39	18.1	10.99	14.97	18.1	22.51	27.18	18.2	25.84	34.70
19.0	43.76	35.88	19.1	55.39	9.03	19.1	10.81	14.80	19.1	22.39	26.87	19.2	25.62	34.57
20.0	43.66	35.60	20.1	55.10	8.69	20.1	10.63	14.62	20.1	22.27	26.56	20.1	25.38	34.44
21.0	43.57	35.29	21.1	54.82	8.37	21.1	10.45	14.41	21.1	22.17	26.26	21.1	25.15	34.28
22.0	43.49	34.98	22.1	54.54	8.05	22.1	10.28	14.19	22.1	22.06	25.98	22.1	24.91	34.11
23.0	43.43	34.66	23.1	54.22	7.75	23.1	10.10	13.94	23.1	21.94	25.71	23.1	24.68	33.90
24.0	43.38	34.34	24.1	53.87	7.44	24.1	9.96	13.68	24.1	21.80	25.45	24.1	24.47	33.70
25.0	43.34	34.03	25.1	53.47	7.15	25.1	9.83	13.41	25.1	21.66	25.19	25.1	24.29	33.48
26.0	43.31	33.75	26.1	53.06	6.84	26.1	9.71	13.16	26.1	21.52	24.92	26.1	24.11	33.28
27.0	43.29	33.47	27.1	52.64	6.49	27.1	9.61	12.93	27.1	21.37	24.61	27.1	23.97	33.08
28.0	43.28	33.20	28.1	52.25	6.12	28.1	9.51	12.72	28.1	21.22	24.29	28.1	23.83	32.88
29.0	43.26	32.92	29.1	51.91	5.76	29.1	9.41	12.51	29.1	21.09	23.93	29.1	23.68	32.71
30.0	43.22	32.65	30.1	51.62	5.36	30.1	9.28	12.29	30.1	20.96	23.58	30.1	23.52	32.54
31.0	43.19	32.38	31.1	51.37	4.97	31.1	9.16	12.07	31.1	20.87	23.22	31.1	23.34	32.37
32.0	43.15	32.07	32.1	51.16	4.59	32.1	9.03	11.85	32.1	20.78	22.87	32.1	23.15	32.18
9.83 −9.78			31.03 +31.01			10.80 −10.75			9.35 +9.29			12.40 −12.36		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
−84° 9' 9''.97			+88° 9' 16''.14			−84° 40' 41''.95			+83° 51' 30''.88			−85° 22' 0''.86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Aug.	14 13	-83 18	Aug.	15 2	+87 33	Aug.	15 24	-84 12	Aug.	16 54	+82 10	Aug.	17 16	-80 47
	s	"		s	"		s	"		s	"		s	"
1.2	46.07	11.65	1.3	66.70	4.45	1.3	26.58	11.96	1.3	18.95	39.83	1.4	22.31	25.92
2.2	45.94	11.69	2.3	66.09	4.42	2.3	26.43	12.06	2.3	18.77	39.98	2.4	22.26	26.12
3.2	45.79	11.71	3.3	65.52	4.36	3.3	26.27	12.17	3.3	18.62	40.11	3.4	22.20	26.33
4.2	45.63	11.73	4.3	64.96	4.28	4.3	26.10	12.28	4.3	18.47	40.23	4.4	22.14	26.55
5.2	45.45	11.74	5.3	64.44	4.20	5.3	25.91	12.39	5.3	18.31	40.33	5.3	22.06	26.77
6.2	45.27	11.73	6.3	63.94	4.14	6.3	25.70	12.48	6.3	18.16	40.43	6.3	21.96	26.99
7.2	45.09	11.69	7.3	63.43	4.08	7.3	25.50	12.54	7.3	18.01	40.53	7.3	21.87	27.19
8.2	44.91	11.64	8.2	62.93	4.03	8.3	25.30	12.59	8.3	17.86	40.66	8.3	21.76	27.38
9.2	44.73	11.56	9.2	62.43	3.99	9.3	25.08	12.61	9.3	17.72	40.79	9.3	21.65	27.55
10.2	44.55	11.48	10.2	61.91	3.96	10.3	24.88	12.62	10.3	17.57	40.93	10.3	21.54	27.70
11.2	44.37	11.38	11.2	61.36	3.94	11.3	24.67	12.61	11.3	17.40	41.07	11.3	21.44	27.84
12.2	44.21	11.29	12.2	60.80	3.91	12.3	24.48	12.59	12.3	17.24	41.21	12.3	21.34	27.97
13.2	44.06	11.19	13.2	60.23	3.86	13.2	24.29	12.61	13.3	17.07	41.36	13.3	21.23	28.07
14.2	43.93	11.09	14.2	59.64	3.81	14.2	24.12	12.60	14.3	16.90	41.49	14.3	21.13	28.19
15.2	43.79	11.02	15.2	59.04	3.73	15.2	23.95	12.60	15.3	16.72	41.60	15.3	21.04	28.31
16.2	43.65	10.96	16.2	58.46	3.64	16.2	23.79	12.62	16.3	16.54	41.70	16.3	20.96	28.44
17.2	43.51	10.90	17.2	57.87	3.53	17.2	23.63	12.65	17.3	16.36	41.77	17.3	20.87	28.59
18.2	43.36	10.83	18.2	57.31	3.40	18.2	23.45	12.67	18.3	16.18	41.82	18.3	20.79	28.73
19.2	43.20	10.77	19.2	56.76	3.25	19.2	23.25	12.70	19.3	16.01	41.87	19.3	20.70	28.91
20.2	43.03	10.69	20.2	56.26	3.10	20.2	23.06	12.71	20.3	15.84	41.91	20.3	20.60	29.07
21.2	42.86	10.60	21.2	55.76	2.95	21.2	22.84	12.72	21.3	15.68	41.95	21.3	20.49	29.22
22.2	42.68	10.47	22.2	55.27	2.81	22.2	22.63	12.70	22.3	15.51	41.98	22.3	20.37	29.36
23.2	42.51	10.33	23.2	54.78	2.69	23.2	22.41	12.66	23.3	15.35	42.03	23.3	20.24	29.46
24.2	42.34	10.16	24.2	54.28	2.59	24.2	22.21	12.58	24.3	15.18	42.12	24.3	20.11	29.55
25.2	42.20	9.99	25.2	53.73	2.50	25.2	22.01	12.50	25.3	15.01	42.21	25.3	19.99	29.61
26.2	42.06	9.82	26.2	53.16	2.40	26.2	21.83	12.41	26.3	14.83	42.29	26.3	19.86	29.66
27.2	41.93	9.65	27.2	52.57	2.28	27.2	21.66	12.32	27.3	14.65	42.36	27.3	19.77	29.70
28.2	41.81	9.50	28.2	51.97	2.14	28.2	21.50	12.26	28.3	14.46	42.42	28.3	19.68	29.74
29.2	41.70	9.36	29.2	51.38	1.97	29.2	21.34	12.21	29.3	14.27	42.46	29.3	19.58	29.81
30.2	41.57	9.23	30.2	50.82	1.78	30.2	21.18	12.16	30.3	14.09	42.46	30.3	19.49	29.90
31.1	41.44	9.11	31.2	50.28	1.57	31.2	21.01	12.11	31.3	13.89	42.44	31.3	19.39	29.99
32.1	41.29	8.98	32.2	49.78	1.35	32.2	20.82	12.07	32.3	13.72	42.41	32.3	19.27	30.10
8.58	-8.52		23.40	+23.38		9.90	-9.85		7.35	+7.28		6.25	-6.17	
14 ^h 13 ^m 37 ^s .066			15 ^h 3 ^m 21 ^s .809			15 ^h 24 ^m 9 ^s .966			16 ^h 54 ^m 19 ^s .238			17 ^h 16 ^m 6 ^s .064		
-83° 17' 37".78			+87° 32' 56".60			-84° 11' 42".92			+82° 10' 27".09			-80° 47' 10".43		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m 17 58	° ' +86 37	Aug.	h m 18 7	° ' -87 40	Aug.	h m 19 1	° ' +89 1	Aug.	h m 19 31	° ' -89 13	Aug.	h m 20 48	° ' +82 13
	s "	"		s "	"		s "	"		s "	"		s "	"
1.4	41.29	5.00	1.4	47.92	0.18	1.4	33.04	21.52	1.5	76.45	16.84	1.5	42.69	56.17
2.4	40.95	5.23	2.4	47.76	0.42	2.4	32.12	21.84	2.4	76.40	17.10	2.5	42.68	56.58
3.4	40.60	5.46	3.4	47.58	0.69	3.4	31.17	22.12	3.4	76.33	17.39	3.5	42.64	56.96
4.4	40.26	5.66	4.4	47.36	0.95	4.4	30.22	22.40	4.4	76.22	17.70	4.5	42.60	57.33
5.4	39.93	5.85	5.4	47.14	1.24	5.4	29.31	22.66	5.4	76.04	18.02	5.5	42.57	57.68
6.4	39.61	6.04	6.4	46.85	1.52	6.4	28.42	22.90	6.4	75.74	18.33	6.5	42.54	58.01
7.4	39.32	6.23	7.4	46.54	1.79	7.4	27.59	23.16	7.4	75.32	18.64	7.5	42.50	58.33
8.4	39.03	6.42	8.4	46.19	2.03	8.4	26.79	23.42	8.4	74.80	18.96	8.5	42.46	58.65
9.4	38.73	6.62	9.4	45.82	2.27	9.4	26.01	23.68	9.4	74.21	19.28	9.5	42.44	58.98
10.4	38.42	6.83	10.4	45.46	2.50	10.4	25.23	23.96	10.4	73.57	19.56	10.5	42.41	59.33
11.4	38.11	7.06	11.4	45.09	2.69	11.4	24.42	24.25	11.4	72.89	19.84	11.5	42.38	59.70
12.4	37.80	7.29	12.4	44.72	2.88	12.4	23.59	24.55	12.4	72.22	20.10	12.5	42.36	60.07
13.4	37.46	7.51	13.4	44.38	3.06	13.4	22.68	24.85	13.4	71.56	20.36	13.5	42.33	60.44
14.4	37.10	7.72	14.4	44.04	3.23	14.4	21.71	25.15	14.4	70.95	20.60	14.5	42.30	60.83
15.4	36.74	7.95	15.4	43.73	3.41	15.4	20.67	25.44	15.4	70.38	20.83	15.5	42.26	61.22
16.3	36.35	8.15	16.4	43.43	3.60	16.4	19.57	25.72	16.4	69.86	21.09	16.5	42.21	61.61
17.3	35.96	8.33	17.4	43.14	3.80	17.4	18.41	25.99	17.4	69.37	21.35	17.5	42.15	61.99
18.3	35.57	8.48	18.3	42.83	4.02	18.4	17.21	26.23	18.4	68.88	21.61	18.5	42.07	62.35
19.3	35.18	8.62	19.3	42.52	4.24	19.4	16.03	26.46	19.4	68.36	21.88	19.5	41.99	62.69
20.3	34.79	8.74	20.3	42.16	4.47	20.4	14.85	26.67	20.4	67.76	22.18	20.5	41.91	63.02
21.3	34.41	8.87	21.3	41.77	4.69	21.4	13.72	26.87	21.4	67.06	22.48	21.5	41.85	63.34
22.3	34.06	8.98	22.3	41.35	4.90	22.4	12.66	27.07	22.4	66.22	22.77	22.4	41.79	63.65
23.3	33.72	9.14	23.3	40.89	5.09	23.4	11.64	27.29	23.4	65.28	23.04	23.4	41.72	63.97
24.3	33.37	9.31	24.3	40.43	5.24	24.4	10.65	27.53	24.4	64.26	23.27	24.4	41.66	64.30
25.3	33.00	9.48	25.3	39.97	5.39	25.4	9.62	27.79	25.4	63.22	23.49	25.4	41.60	64.65
26.3	32.62	9.66	26.3	39.54	5.49	26.4	8.52	28.05	26.4	62.21	23.69	26.4	41.55	65.02
27.3	32.22	9.84	27.3	39.14	5.59	27.4	7.35	28.31	27.4	61.26	23.90	27.4	41.47	65.40
28.3	31.81	10.01	28.3	38.76	5.72	28.4	6.10	28.58	28.4	60.40	24.10	28.4	41.40	65.79
29.3	31.37	10.15	29.3	38.39	5.85	29.4	4.77	28.83	29.4	59.60	24.31	29.4	41.32	66.16
30.3	30.94	10.26	30.3	38.04	6.00	30.4	3.39	29.04	30.4	58.82	24.53	30.4	41.23	66.53
31.3	30.50	10.36	31.3	37.66	6.16	31.3	2.02	29.24	31.4	58.01	24.75	31.4	41.13	66.86
32.3	30.07	10.44	32.3	37.25	6.33	32.3	0.68	29.42	32.4	57.14	24.99	32.4	41.02	67.18
16.96 +16.93			24.57 -24.55			58.69 +58.68			73.69 -73.68			7.40 +7.33		
17 ^h 58 ^m 41 ^s .809			18 ^h 6 ^m 47 ^s .620			19 ^h 1 ^m 27 ^s .463			19 ^h 29 ^m 16 ^s .746			20 ^h 48 ^m 36 ^s .323		
+86° 36' 51".12			-87° 39' 51".38			+89° 1' 7".53			-89° 13' 21".02			+82° 13' 43".34		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			89 H. Cephei. Mag. 5.6			γ ¹ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h ^o m	° ' "		h m	° ' "		h m	° ' "		h m	° ' "		h m	° ' "
Aug.	21 38	−83 5	Aug.	22 16	−86 22	Aug.	22 37	−81 48	Aug.	23 28	+86 51	Aug.	23 47	−82 27
	s	"		s	"		s	"		s	"		s	"
1.5	47.66	27.56	1.6	49.45	41.78	1.6	58.33	13.90	1.6	2.68	23.99	1.6	29.03	53.71
2.5	47.75	27.78	2.6	49.63	42.00	2.6	58.43	14.09	2.6	2.92	24.33	2.6	29.17	53.83
3.5	47.84	28.01	3.6	49.84	42.24	3.6	58.53	14.29	3.6	3.14	24.68	3.6	29.31	53.96
4.5	47.93	28.28	4.6	50.05	42.49	4.6	58.64	14.51	4.6	3.33	25.03	4.6	29.46	54.11
5.5	48.01	28.56	5.6	50.25	42.75	5.6	58.74	14.74	5.6	3.52	25.36	5.6	29.61	54.28
6.5	48.08	28.86	6.6	50.43	43.03	6.6	58.84	14.99	6.6	3.69	25.68	6.6	29.75	54.46
7.5	48.14	29.17	7.6	50.59	43.32	7.6	58.93	15.26	7.6	3.87	25.98	7.6	29.88	54.65
8.5	48.19	29.48	8.5	50.73	43.60	8.6	59.01	15.55	8.6	4.06	26.28	8.6	30.00	54.87
9.5	48.22	29.79	9.5	50.84	43.90	9.6	59.07	15.82	9.6	4.26	26.57	9.6	30.11	55.10
10.5	48.25	30.09	10.5	50.94	44.20	10.6	59.12	16.09	10.6	4.48	26.88	10.6	30.22	55.33
11.5	48.26	30.38	11.5	51.02	44.50	11.6	59.18	16.36	11.6	4.71	27.19	11.6	30.32	55.57
12.5	48.27	30.67	12.5	51.10	44.77	12.6	59.23	16.63	12.6	4.93	27.50	12.6	30.41	55.80
13.5	48.29	30.94	13.5	51.17	45.04	13.5	59.28	16.88	13.6	5.16	27.83	13.6	30.50	56.02
14.5	48.32	31.20	14.5	51.25	45.29	14.5	59.33	17.12	14.6	5.38	28.19	14.6	30.59	56.22
15.5	48.35	31.46	15.5	51.33	45.54	15.5	59.38	17.36	15.6	5.58	28.55	15.6	30.68	56.43
16.5	48.37	31.70	16.5	51.42	45.79	16.5	59.44	17.59	16.6	5.77	28.93	16.6	30.78	56.63
17.5	48.41	31.96	17.5	51.53	46.05	17.5	59.50	17.82	17.6	5.92	29.31	17.6	30.89	56.81
18.5	48.45	32.23	18.5	51.66	46.32	18.5	59.57	18.07	18.6	6.06	29.70	18.6	31.01	57.01
19.5	48.50	32.52	19.5	51.78	46.61	19.5	59.64	18.34	19.6	6.17	30.07	19.6	31.13	57.22
20.5	48.53	32.83	20.5	51.89	46.92	20.5	59.71	18.62	20.6	6.27	30.43	20.6	31.24	57.45
21.5	48.55	33.15	21.5	51.99	47.23	21.5	59.78	18.92	21.6	6.36	30.78	21.6	31.34	57.69
22.5	48.56	33.48	22.5	52.06	47.55	22.5	59.83	19.23	22.6	6.47	31.11	22.6	31.43	57.97
23.5	48.55	33.80	23.5	52.09	47.88	23.5	59.86	19.56	23.6	6.59	31.43	23.6	31.52	58.25
24.5	48.52	34.11	24.5	52.10	48.19	24.5	59.88	19.85	24.6	6.73	31.76	24.6	31.59	58.54
25.5	48.49	34.40	25.5	52.10	48.48	25.5	59.89	20.14	25.6	6.90	32.12	25.6	31.65	58.81
26.5	48.45	34.68	26.5	52.08	48.76	26.5	59.90	20.42	26.5	7.07	32.48	26.6	31.70	59.08
27.5	48.43	34.93	27.5	52.07	49.03	27.5	59.91	20.68	27.5	7.22	32.87	27.6	31.75	59.33
28.5	48.42	35.17	28.5	52.07	49.29	28.5	59.92	20.92	28.5	7.37	33.27	28.6	31.81	59.56
29.5	48.41	35.42	29.5	52.10	49.55	29.5	59.95	21.17	29.5	7.48	33.69	29.6	31.88	59.79
30.5	48.41	35.69	30.5	52.13	49.82	30.5	59.99	21.43	30.5	7.56	34.10	30.6	31.96	60.02
31.5	48.42	35.97	31.5	52.18	50.10	31.5	60.03	21.70	31.5	7.61	34.49	31.5	32.04	60.26
32.5	48.41	36.27	32.5	52.21	50.40	32.5	60.06	21.99	32.5	7.65	34.88	32.5	32.12	60.52
8.31 −8.25			15.83 −15.80			7.01 −6.94			18.24 +18.22			7.63 −7.56		
21 ^h 38 ^m 29 ^s .050			22 ^h 16 ^m 20 ^s .949			22 ^h 37 ^m 45 ^s .323			23 ^h 27 ^m 43 ^s .851			23 ^h 47 ^m 20 ^s .032		
−83° 5' 50''.66			−86° 23' 9''.03			−81° 48' 43''.57			+86° 51' 18''.76			−82° 28' 28''.42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

48 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Sept.	0 57	+85 49	Sept.	1 32	+88 52	Sept.	1 42	-85 10	Sept.	4 10	+85 20	Sept.	5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.6	39.79	13.05	0.6	1.13	6.69	0.6	3.58	30.47	0.7	39.80	9.46	0.8	46.36	15.64
1.6	39.94	13.39	1.6	1.87	7.01	1.6	3.79	30.64	1.7	40.11	9.58	1.8	46.67	15.61
2.6	40.09	13.73	2.6	2.56	7.32	2.6	4.01	30.83	2.7	40.40	9.69	2.8	46.96	15.59
3.6	40.23	14.05	3.6	3.23	7.61	3.6	4.21	31.05	3.7	40.68	9.78	3.8	47.24	15.56
4.6	40.38	14.36	4.6	3.91	7.90	4.6	4.41	31.27	4.7	40.96	9.88	4.8	47.52	15.53
5.6	40.52	14.68	5.6	4.60	8.16	5.6	4.60	31.50	5.7	41.23	9.96	5.8	47.79	15.48
6.6	40.69	14.97	6.6	5.35	8.44	6.6	4.77	31.77	6.7	41.51	10.04	6.8	48.05	15.42
7.6	40.87	15.26	7.6	6.13	8.72	7.6	4.93	32.03	7.7	41.80	10.11	7.8	48.33	15.36
8.6	41.04	15.58	8.6	6.92	9.01	8.6	5.08	32.30	8.7	42.11	10.17	8.8	48.61	15.29
9.6	41.22	15.90	9.6	7.74	9.31	9.6	5.22	32.55	9.7	42.42	10.25	9.8	48.92	15.22
10.6	41.41	16.24	10.6	8.57	9.62	10.6	5.35	32.80	10.7	42.73	10.34	10.8	49.23	15.16
11.6	41.59	16.61	11.6	9.38	9.94	11.6	5.49	33.04	11.7	43.06	10.43	11.8	49.55	15.12
12.6	41.76	16.98	12.6	10.16	10.27	12.6	5.63	33.27	12.7	43.39	10.55	12.8	49.89	15.11
13.6	41.91	17.35	13.6	10.89	10.62	13.6	5.77	33.50	13.7	43.72	10.70	13.8	50.23	15.10
14.6	42.05	17.75	14.6	11.56	10.98	14.6	5.91	33.72	14.7	44.04	10.87	14.8	50.56	15.11
15.6	42.16	18.13	15.6	12.16	11.36	15.6	6.07	33.94	15.7	44.35	11.04	15.7	50.89	15.14
16.6	42.26	18.52	16.6	12.69	11.73	16.6	6.24	34.17	16.7	44.65	11.21	16.7	51.21	15.18
17.6	42.36	18.89	17.6	13.19	12.08	17.6	6.39	34.42	17.7	44.93	11.38	17.7	51.50	15.22
18.5	42.44	19.23	18.6	13.68	12.40	18.6	6.54	34.69	18.7	45.20	11.54	18.7	51.79	15.26
19.5	42.53	19.58	19.6	14.20	12.73	19.6	6.69	34.97	19.7	45.46	11.69	19.7	52.07	15.27
20.5	42.63	19.92	20.6	14.76	13.05	20.6	6.81	35.29	20.7	45.73	11.83	20.7	52.34	15.28
21.5	42.76	20.24	21.6	15.37	13.37	21.6	6.91	35.61	21.7	46.01	11.95	21.7	52.63	15.27
22.5	42.91	20.60	22.6	16.05	13.69	22.6	6.99	35.92	22.7	46.31	12.07	22.7	52.94	15.26
23.5	43.05	20.97	23.6	16.74	14.03	23.6	7.06	36.21	23.7	46.63	12.20	23.7	53.27	15.24
24.5	43.19	21.35	24.6	17.42	14.38	24.6	7.14	36.48	24.7	46.95	12.35	24.7	53.61	15.25
25.5	43.32	21.76	25.6	18.06	14.76	25.6	7.22	36.75	25.7	47.27	12.53	25.7	53.95	15.28
26.5	43.42	22.17	26.5	18.62	15.16	26.6	7.30	37.01	26.7	47.60	12.74	26.7	54.29	15.33
27.5	43.51	22.59	27.5	19.10	15.57	27.6	7.39	37.27	27.7	47.90	12.97	27.7	54.63	15.42
28.5	43.56	23.00	28.5	19.48	15.95	28.6	7.50	37.53	28.7	48.19	13.19	28.7	54.96	15.51
29.5	43.61	23.39	29.5	19.81	16.32	29.5	7.61	37.81	29.7	48.45	13.41	29.7	55.26	15.61
30.5	43.64	23.75	30.5	20.12	16.69	30.5	7.72	38.12	30.6	48.70	13.63	30.7	55.55	15.70
31.5	43.67	24.11	31.5	20.42	17.03	31.5	7.81	38.44	31.6	48.94	13.83	31.7	55.82	15.76
13.72 +13.69			50.70 +50.69			11.89 -11.85			12.30 +12.26			11.84 +11.80		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .554		
+85° 49' 4''.72			+88° 52' 2''.06			-85° 11' 3''.34			+85° 20' 19''.62			+85° 9' 32''.39		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			5 Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelopardalis. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Sept.	5 45	-84 49	Sept.	6 46	-80 43	Sept.	7 2	+87 10	Sept.	7 14	+82 33	Sept.	7 15	-86 54
	s	"		s	"		s	"		s	"		s	"
0.8	46.27	27.26	0.8	44.13	31.13	0.8	46.22	27.98	0.9	1.41	62.75	0.9	24.01	6.84
1.8	46.49	27.13	1.8	44.24	30.91	1.8	46.70	27.81	1.9	1.59	62.56	1.9	24.27	6.59
2.8	46.71	26.99	2.8	44.34	30.69	2.8	47.14	27.66	2.9	1.76	62.39	2.9	24.55	6.35
3.8	46.94	26.85	3.8	44.47	30.49	3.8	47.56	27.50	3.8	1.91	62.22	3.9	24.86	6.11
4.8	47.19	26.74	4.8	44.59	30.31	4.8	47.97	27.33	4.8	2.06	62.05	4.8	25.19	5.88
5.8	47.43	26.65	5.8	44.72	30.14	5.8	48.37	27.16	5.8	2.21	61.87	5.8	25.52	5.69
6.8	47.69	26.58	6.8	44.84	29.99	6.8	48.77	26.98	6.8	2.36	61.67	6.8	25.88	5.50
7.8	47.93	26.53	7.8	44.97	29.85	7.8	49.18	26.79	7.8	2.51	61.47	7.8	26.24	5.33
8.8	48.16	26.49	8.8	45.10	29.75	8.8	49.59	26.59	8.8	2.67	61.26	8.8	26.60	5.19
9.8	48.40	26.46	9.8	45.22	29.64	9.8	50.04	26.39	9.8	2.84	61.04	9.8	26.94	5.05
10.8	48.63	26.44	10.8	45.34	29.53	10.8	50.51	26.18	10.8	3.02	60.83	10.8	27.28	4.92
11.8	48.85	26.42	11.8	45.48	29.43	11.8	50.99	26.00	11.8	3.20	60.63	11.8	27.61	4.79
12.8	49.07	26.40	12.8	45.58	29.33	12.8	51.51	25.82	12.8	3.39	60.43	12.8	27.93	4.66
13.8	49.29	26.36	13.8	45.70	29.20	13.8	52.02	25.67	13.8	3.59	60.27	13.8	28.23	4.52
14.8	49.50	26.31	14.8	45.82	29.09	14.8	52.57	25.52	14.8	3.80	60.11	14.8	28.54	4.37
15.8	49.73	26.26	15.8	45.94	28.96	15.8	53.10	25.40	15.8	4.01	59.97	15.8	28.85	4.20
16.8	49.95	26.21	16.8	46.06	28.82	16.8	53.62	25.30	16.8	4.21	59.84	16.8	29.17	4.04
17.8	50.18	26.16	17.8	46.18	28.69	17.8	54.10	25.20	17.8	4.40	59.72	17.8	29.52	3.87
18.7	50.44	26.12	18.8	46.32	28.58	18.8	54.57	25.10	18.8	4.57	59.62	18.8	29.89	3.72
19.7	50.70	26.11	19.8	46.45	28.48	19.8	55.03	24.97	19.8	4.74	59.50	19.8	30.28	3.57
20.7	50.95	26.13	20.8	46.59	28.41	20.8	55.48	24.84	20.8	4.91	59.36	20.8	30.69	3.46
21.7	51.20	26.17	21.8	46.74	28.36	21.8	55.93	24.69	21.8	5.08	59.19	21.8	31.10	3.39
22.7	51.44	26.23	22.8	46.88	28.35	22.8	56.40	24.55	22.8	5.26	59.02	22.8	31.49	3.34
23.7	51.67	26.30	23.8	47.01	28.35	23.8	56.91	24.40	23.8	5.46	58.85	23.8	31.87	3.30
24.7	51.89	26.37	24.8	47.14	28.34	24.8	57.45	24.24	24.8	5.66	58.70	24.8	32.22	3.26
25.7	52.10	26.44	25.8	47.26	28.33	25.8	58.02	24.11	25.8	5.88	58.55	25.8	32.56	3.20
26.7	52.31	26.49	26.8	47.38	28.30	26.8	58.58	24.01	26.8	6.11	58.42	26.8	32.90	3.12
27.7	52.52	26.52	27.8	47.51	28.25	27.8	59.15	23.93	27.8	6.32	58.32	27.8	33.24	3.05
28.7	52.75	26.55	28.8	47.64	28.19	28.8	59.70	23.88	28.8	6.54	58.24	28.8	33.59	2.96
29.7	52.98	26.57	29.8	47.77	28.14	29.8	60.22	23.82	29.8	6.74	58.18	29.8	33.96	2.86
30.7	53.22	26.60	30.8	47.91	28.10	30.8	60.73	23.78	30.8	6.93	58.12	30.8	34.36	2.77
31.7	53.47	26.65	31.8	48.05	28.06	31.8	61.20	23.74	31.8	7.11	58.07	31.8	34.77	2.68
11.08 -11.04			6.20 -6.12			20.28 +20.26			7.73 +7.66			18.50 -18.47		
5 ^h 46 ^m 3 ^s .075			6 ^h 46 ^m 53 ^s .600			7 ^h 2 ^m 33 ^s .206			7 ^h 13 ^m 55 ^s .106			7 ^h 16 ^m 0 ^s .004		
-84° 49' 45".59			-80° 43' 42".15			+87° 10' 49".32			+82° 34' 23".73			-86° 54' 13".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Sept.	8 16	+88 52	Sept.	9 8	-85 20	Sept.	9 25	+81 40	Sept.	9 36	-80 34	Sept.	10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
0.9	51.48	26.32	0.9	27.61	21.18	0.9	30.50	65.02	0.9	11.91	35.16	0.9	9.07	17.12
1.9	52.39	26.05	1.9	27.67	20.87	1.9	30.59	64.67	1.9	11.93	34.83	1.9	9.12	16.75
2.9	53.26	25.79	2.9	27.75	20.55	2.9	30.68	64.36	2.9	11.96	34.50	2.9	9.18	16.41
3.9	54.10	25.55	3.9	27.84	20.23	3.9	30.76	64.07	3.9	11.99	34.16	3.9	9.23	16.07
4.9	54.89	25.31	4.9	27.94	19.91	4.9	30.82	63.78	4.9	12.03	33.82	4.9	9.27	15.74
5.9	55.65	25.04	5.9	28.07	19.60	5.9	30.88	63.46	5.9	12.07	33.50	5.9	9.30	15.42
6.9	56.41	24.77	6.9	28.22	19.31	6.9	30.94	63.15	6.9	12.13	33.19	6.9	9.33	15.08
7.9	57.17	24.49	7.9	28.36	19.03	7.9	31.00	62.83	7.9	12.19	32.90	7.9	9.35	14.73
8.9	57.96	24.20	8.9	28.51	18.75	8.9	31.07	62.49	8.9	12.25	32.61	8.9	9.38	14.37
9.9	58.78	23.91	9.9	28.66	18.49	9.9	31.15	62.13	9.9	12.31	32.34	9.9	9.41	13.99
10.9	59.67	23.62	10.9	28.81	18.25	10.9	31.23	61.78	10.9	12.37	32.08	10.9	9.45	13.61
11.9	60.62	23.32	11.9	28.95	18.01	11.9	31.31	61.42	11.9	12.44	31.82	11.9	9.51	13.22
12.9	61.63	23.03	12.9	29.09	17.78	12.9	31.41	61.08	12.9	12.50	31.58	12.9	9.58	12.82
13.9	62.69	22.75	13.9	29.22	17.54	13.9	31.52	60.74	13.9	12.56	31.34	13.9	9.66	12.43
14.9	63.79	22.51	14.9	29.35	17.30	14.9	31.65	60.41	14.9	12.61	31.07	14.9	9.74	12.05
15.9	64.91	22.26	15.9	29.47	17.04	15.9	31.77	60.08	15.9	12.67	30.81	15.9	9.84	11.68
16.9	66.01	22.03	16.9	29.60	16.78	16.9	31.88	59.78	16.9	12.72	30.53	16.9	9.94	11.34
17.9	67.07	21.84	17.9	29.73	16.50	17.9	31.99	59.49	17.9	12.78	30.23	17.9	10.03	11.01
18.9	68.07	21.64	18.9	29.90	16.22	18.9	32.10	59.21	18.9	12.84	29.94	18.9	10.11	10.68
19.8	69.02	21.42	19.9	30.07	15.95	19.9	32.20	58.93	19.9	12.91	29.66	19.9	10.17	10.36
20.8	69.95	21.19	20.9	30.26	15.71	20.9	32.28	58.62	20.9	13.01	29.38	20.9	10.23	10.03
21.8	70.87	20.95	21.9	30.47	15.47	21.9	32.37	58.31	21.9	13.10	29.14	21.9	10.31	9.68
22.8	71.84	20.68	22.9	30.69	15.27	22.9	32.46	57.99	22.9	13.19	28.90	22.9	10.38	9.32
23.8	72.86	20.42	23.9	30.90	15.09	23.9	32.57	57.66	23.9	13.29	28.71	23.9	10.45	8.94
24.8	73.96	20.16	24.9	31.10	14.93	24.9	32.69	57.31	24.9	13.39	28.51	24.9	10.53	8.55
25.8	75.14	19.92	25.9	31.28	14.75	25.9	32.82	56.97	25.9	13.48	28.31	25.9	10.63	8.16
26.8	76.38	19.68	26.9	31.45	14.56	26.9	32.96	56.65	26.9	13.57	28.11	26.9	10.76	7.77
27.8	77.63	19.48	27.9	31.62	14.37	27.9	33.11	56.35	27.9	13.65	27.90	27.9	10.88	7.40
28.8	78.85	19.29	28.9	31.80	14.16	28.9	33.25	56.06	28.9	13.72	27.67	28.9	11.01	7.07
29.8	80.04	19.12	29.9	31.97	13.94	29.9	33.38	55.80	29.9	13.81	27.40	29.9	11.13	6.75
30.8	81.19	18.97	30.9	32.17	13.71	30.9	33.52	55.56	30.9	13.90	27.16	30.9	11.24	6.42
31.8	82.28	18.82	31.9	32.40	13.49	31.9	33.63	55.32	31.9	13.98	26.91	31.9	11.35	6.13
50.84 +50.83			12.30 -12.26			6.91 +6.84			6.11 -6.02			8.17 +8.11		
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
+88° 52' 49".08			-85° 20' 12".12			+81° 41' 25".82			-80° 34' 23".04			+82° 58' 35".87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m 10 59	° ' -84 9	Sept.	h m 12 13	° ' +88 8	Sept.	h m 12 46	° ' -84 41	Sept.	h m 12 48	° ' +83 51	Sept.	h m 13 27	° ' -85 22
	s "	"		s "	"		s "	"		s "	"		s "	"
1.0	43.15	32.07	1.1	51.16	64.59	1.1	9.03	11.85	1.1	20.78	22.87	1.1	23.15	32.18
2.0	43.11	31.76	2.1	50.98	64.24	2.1	8.89	11.62	2.1	20.70	22.54	2.1	22.96	31.98
3.0	43.06	31.42	3.1	50.81	63.90	3.1	8.75	11.36	3.1	20.62	22.22	3.1	22.75	31.75
4.0	43.03	31.08	4.1	50.63	63.56	4.1	8.61	11.06	4.1	20.53	21.90	4.1	22.56	31.50
5.0	43.02	30.76	5.1	50.41	63.23	5.1	8.47	10.77	5.1	20.44	21.59	5.1	22.37	31.23
5.9	43.01	30.42	6.0	50.18	62.91	6.1	8.36	10.46	6.1	20.34	21.29	6.1	22.19	30.97
6.9	43.02	30.08	7.0	49.93	62.59	7.1	8.26	10.15	7.1	20.24	20.99	7.1	22.02	30.70
7.9	43.04	29.76	8.0	49.66	62.25	8.1	8.17	9.85	8.1	20.14	20.69	8.1	21.88	30.42
8.9	43.07	29.44	9.0	49.40	61.90	9.1	8.09	9.55	9.1	20.03	20.38	9.1	21.76	30.14
9.9	43.10	29.13	10.0	49.14	61.53	10.1	8.03	9.27	10.1	19.92	20.04	10.1	21.63	29.87
10.9	43.13	28.82	11.0	48.90	61.16	11.1	7.98	8.99	11.1	19.81	19.69	11.1	21.53	29.60
11.9	43.16	28.54	12.0	48.68	60.75	12.1	7.92	8.72	12.1	19.72	19.33	12.1	21.43	29.36
12.9	43.19	28.27	13.0	48.49	60.36	13.1	7.85	8.45	13.1	19.63	18.95	13.1	21.31	29.12
13.9	43.21	27.99	14.0	48.35	59.96	14.0	7.77	8.19	14.1	19.55	18.56	14.1	21.19	28.88
14.9	43.22	27.71	15.0	48.25	59.55	15.0	7.70	7.93	15.0	19.50	18.17	15.1	21.07	28.65
15.9	43.23	27.43	16.0	48.20	59.16	16.0	7.62	7.67	16.0	19.44	17.78	16.1	20.93	28.42
16.9	43.24	27.12	17.0	48.17	58.78	17.0	7.54	7.40	17.0	19.40	17.40	17.1	20.78	28.17
17.9	43.27	26.81	18.0	48.15	58.40	18.0	7.45	7.09	18.0	19.36	17.04	18.1	20.64	27.89
18.9	43.30	26.48	19.0	48.10	58.04	19.0	7.36	6.76	19.0	19.31	16.71	19.1	20.50	27.59
19.9	43.34	26.14	20.0	48.01	57.69	20.0	7.30	6.43	20.0	19.26	16.36	20.1	20.37	27.28
20.9	43.40	25.81	21.0	47.88	57.34	21.0	7.26	6.08	21.0	19.18	16.03	21.1	20.28	26.96
21.9	43.48	25.48	22.0	47.72	56.99	22.0	7.25	5.75	22.0	19.11	15.69	22.1	20.21	26.64
22.9	43.57	25.19	23.0	47.57	56.60	23.0	7.24	5.44	23.0	19.03	15.32	23.1	20.16	26.31
23.9	43.67	24.91	24.0	47.43	56.20	24.0	7.24	5.15	24.0	18.95	14.95	24.1	20.12	26.03
24.9	43.76	24.64	24.9	47.32	55.78	25.0	7.24	4.87	25.0	18.89	14.54	25.0	20.08	25.77
25.9	43.84	24.38	25.9	47.26	55.36	26.0	7.24	4.60	26.0	18.84	14.12	26.0	20.04	25.52
26.9	43.92	24.14	26.9	47.25	54.94	27.0	7.22	4.33	27.0	18.81	13.70	27.0	19.98	25.26
27.9	43.97	23.88	27.9	47.29	54.51	28.0	7.19	4.06	28.0	18.79	13.29	28.0	19.90	24.99
28.9	44.03	23.61	28.9	47.37	54.10	29.0	7.16	3.76	29.0	18.78	12.90	29.0	19.82	24.71
29.9	44.09	23.31	29.9	47.45	53.73	30.0	7.13	3.44	30.0	18.78	12.52	30.0	19.73	24.40
30.9	44.17	23.00	30.9	47.54	53.36	31.0	7.10	3.11	31.0	18.78	12.16	31.0	19.64	24.09
31.9	44.24	22.68	31.9	47.60	53.00	32.0	7.08	2.77	32.0	18.75	11.79	32.0	19.57	23.77
9.82 -9.77			30.97 ÷30.96			10.80 -10.75			9.34 +9.29			12.40 -12.36		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
-84° 9' 9''.97			+88° 9' 16''.14			-84° 40' 41''.95			+83° 51' 30''.88			-85° 22' 0''.86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2288. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m 14 13	° ' " -83 18	Sept.	h m 15 2	° ' " +87 32	Sept.	h m 15 24	° ' " -84 12	Sept.	h m 16 54	° ' " +82 10	Sept.	h m 17 16	° ' " -80 47
	s "	"		s "	"		s "	"		s "	"		s "	"
1.1	41.29	8.98	1.2	49.78	61.35	1.2	20.82	12.07	1.3	13.72	42.41	1.3	19.27	30.10
2.1	41.14	8.83	2.2	49.30	61.16	2.2	20.62	12.00	2.3	13.54	42.38	2.3	19.15	30.19
3.1	40.98	8.65	3.2	48.84	60.97	3.2	20.41	11.92	3.3	13.37	42.35	3.3	19.02	30.27
4.1	40.81	8.47	4.2	48.39	60.78	4.2	20.19	11.82	4.3	13.20	42.34	4.3	18.88	30.32
5.1	40.67	8.28	5.2	47.93	60.59	5.2	19.98	11.70	5.2	13.03	42.33	5.3	18.74	30.36
6.1	40.52	8.05	6.2	47.46	60.42	6.2	19.77	11.56	6.2	12.86	42.33	6.3	18.60	30.38
7.1	40.38	7.81	7.2	46.97	60.26	7.2	19.58	11.40	7.2	12.69	42.34	7.3	18.46	30.39
8.1	40.25	7.58	8.2	46.47	60.10	8.2	19.39	11.23	8.2	12.52	42.35	8.3	18.33	30.39
9.1	40.12	7.35	9.2	45.97	59.93	9.2	19.21	11.09	9.2	12.34	42.36	9.3	18.20	30.35
10.1	40.02	7.10	10.2	45.44	59.75	10.2	19.04	10.93	10.2	12.15	42.36	10.2	18.07	30.32
11.1	39.92	6.87	11.2	44.91	59.56	11.2	18.89	10.78	11.2	11.96	42.33	11.2	17.97	30.29
12.1	39.82	6.65	12.2	44.39	59.34	12.2	18.74	10.64	12.2	11.77	42.31	12.2	17.86	30.28
13.1	39.72	6.45	13.1	43.87	59.11	13.2	18.59	10.50	13.2	11.59	42.26	13.2	17.75	30.28
14.1	39.62	6.25	14.1	43.36	58.84	14.2	18.42	10.36	14.2	11.40	42.18	14.2	17.65	30.28
15.1	39.50	6.06	15.1	42.89	58.57	15.2	18.26	10.25	15.2	11.21	42.08	15.2	17.53	30.29
16.1	39.38	5.85	16.1	42.44	58.30	16.2	18.10	10.12	16.2	11.03	41.98	16.2	17.41	30.30
17.1	39.27	5.64	17.1	42.02	58.03	17.2	17.91	9.99	17.2	10.86	41.87	17.2	17.29	30.31
18.1	39.13	5.42	18.1	41.61	57.77	18.1	17.73	9.82	18.2	10.69	41.76	18.2	17.16	30.31
19.1	39.01	5.16	19.1	41.21	57.53	19.1	17.54	9.64	19.2	10.52	41.67	19.2	17.01	30.28
20.1	38.89	4.89	20.1	40.80	57.31	20.1	17.36	9.44	20.2	10.35	41.60	20.2	16.87	30.23
21.1	38.79	4.59	21.1	40.36	57.08	21.1	17.19	9.22	21.2	10.17	41.56	21.2	16.74	30.14
22.1	38.70	4.28	22.1	39.90	56.87	22.1	17.04	8.98	22.2	9.99	41.51	22.2	16.61	30.05
23.1	38.64	3.99	23.1	39.42	56.64	23.1	16.90	8.73	23.2	9.82	41.46	23.2	16.49	29.95
24.1	38.59	3.72	24.1	38.92	56.40	24.1	16.79	8.52	24.2	9.63	41.38	24.2	16.39	29.83
25.1	38.53	3.45	25.1	38.42	56.13	25.1	16.67	8.33	25.2	9.43	41.28	25.2	16.29	29.74
26.1	38.48	3.22	26.1	37.95	55.83	26.1	16.55	8.14	26.2	9.25	41.15	26.2	16.19	29.66
27.1	38.40	2.98	27.1	37.51	55.52	27.1	16.43	7.95	27.2	9.07	41.01	27.2	16.09	29.58
28.1	38.32	2.75	28.1	37.11	55.20	28.1	16.30	7.77	28.2	8.89	40.84	28.2	15.99	29.53
29.1	38.24	2.51	29.1	36.74	54.87	29.1	16.16	7.58	29.2	8.71	40.68	29.2	15.86	29.47
30.1	38.15	2.25	30.1	36.40	54.58	30.1	15.99	7.37	30.2	8.56	40.53	30.2	15.74	29.41
31.1	38.05	1.98	31.1	36.06	54.29	31.1	15.83	7.14	31.2	8.41	40.38	31.2	15.60	29.33
32.1	37.96	1.66	32.1	35.73	54.00	32.1	15.68	6.88	32.2	8.24	40.23	32.2	15.47	29.23
8.57 -8.51			23.39 +23.37			9.90 -9.85			7.35 +7.28			6.25 -6.17		
14 ^h 13 ^m 37 ^s .066			15 ^h 3 ^m 21 ^s .809			15 ^h 24 ^m 9 ^s .966			16 ^h 54 ^m 19 ^s .238			17 ^h 16 ^m 6 ^s .064		
-83° 17' 37''.78			+87° 32' 56''.60			-84° 11' 42''.92			+82° 10' 27''.09			-80° 47' 10''.43		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "
Sept.	17 58	+86 37	Sept.	18 7	-87 40	Sept.	19 0	+89 1	Sept.	19 31	-89 13	Sept.	20 48	+82 14
1.3	30.07	10.44	1.3	37.25	6.33	1.3	60.68	29.42	1.4	57.14	24.99	1.4	41.02	7.18
2.3	29.67	10.50	2.3	36.80	6.49	2.3	59.38	29.57	2.4	56.17	25.26	2.4	40.92	7.46
3.3	29.28	10.56	3.3	36.33	6.64	3.3	58.13	29.72	3.4	55.08	25.51	3.4	40.82	7.76
4.3	28.89	10.64	4.3	35.81	6.79	4.3	56.92	29.88	4.4	53.90	25.74	4.4	40.72	8.04
5.3	28.52	10.73	5.3	35.29	6.90	5.3	55.75	30.05	5.4	52.65	25.97	5.4	40.63	8.34
6.3	28.15	10.82	6.3	34.76	7.00	6.3	54.59	30.23	6.4	51.33	26.17	6.4	40.54	8.63
7.3	27.77	10.91	7.3	34.23	7.11	7.3	53.42	30.42	7.3	49.98	26.36	7.4	40.45	8.95
8.3	27.38	11.01	8.3	33.70	7.15	8.3	52.22	30.61	8.3	48.63	26.54	8.4	40.36	9.26
9.3	26.97	11.12	9.3	33.19	7.21	9.3	50.98	30.80	9.3	47.30	26.70	9.4	40.27	9.58
10.3	26.55	11.24	10.3	32.71	7.25	10.3	49.68	31.01	10.3	46.02	26.87	10.4	40.17	9.92
11.3	26.12	11.34	11.3	32.24	7.29	11.3	48.32	31.21	11.3	44.78	27.01	11.4	40.07	10.25
12.3	25.67	11.42	12.3	31.78	7.33	12.3	46.90	31.39	12.3	43.59	27.15	12.4	39.94	10.58
13.3	25.22	11.48	13.3	31.35	7.41	13.3	45.43	31.56	13.3	42.46	27.32	13.4	39.82	10.90
14.3	24.77	11.52	14.3	30.93	7.48	14.3	43.93	31.70	14.3	41.34	27.48	14.4	39.70	11.20
15.3	24.31	11.54	15.3	30.49	7.55	15.3	42.39	31.84	15.3	40.23	27.65	15.4	39.57	11.49
16.3	23.87	11.55	16.3	30.02	7.62	16.3	40.90	31.95	16.3	39.05	27.82	16.4	39.43	11.77
17.3	23.45	11.55	17.3	29.52	7.70	17.3	39.45	32.05	17.3	37.79	28.00	17.4	39.30	12.01
18.3	23.03	11.54	18.3	28.99	7.78	18.3	38.08	32.14	18.3	36.43	28.18	18.4	39.17	12.25
19.3	22.64	11.54	19.3	28.43	7.83	19.3	36.75	32.24	19.3	34.97	28.35	19.4	39.05	12.49
20.3	22.25	11.57	20.3	27.87	7.84	20.3	35.45	32.37	20.3	33.42	28.49	20.4	38.93	12.75
21.2	21.84	11.61	21.3	27.31	7.85	21.3	34.15	32.50	21.3	31.84	28.60	21.4	38.81	13.01
22.2	21.43	11.67	22.3	26.78	7.81	22.3	32.80	32.65	22.3	30.28	28.69	22.4	38.70	13.29
23.2	21.00	11.73	23.2	26.27	7.77	23.3	31.39	32.80	23.3	28.80	28.76	23.4	38.59	13.61
24.2	20.54	11.77	24.2	25.80	7.73	24.3	29.91	32.96	24.3	27.39	28.83	24.4	38.46	13.91
25.2	20.07	11.79	25.2	25.37	7.69	25.3	28.34	33.10	25.3	26.07	28.90	25.4	38.32	14.20
26.2	19.60	11.79	26.2	24.94	7.66	26.3	26.74	33.20	26.3	24.80	28.98	26.4	38.17	14.49
27.2	19.13	11.76	27.2	24.49	7.65	27.3	25.12	33.29	27.3	23.54	29.07	27.4	38.02	14.76
28.2	18.67	11.71	28.2	24.03	7.66	28.3	23.53	33.35	28.3	22.24	29.18	28.3	37.87	14.99
29.2	18.24	11.65	29.2	23.54	7.68	29.3	21.99	33.40	29.3	20.86	29.30	29.3	37.71	15.19
30.2	17.82	11.58	30.2	23.02	7.69	30.3	20.50	33.44	30.3	19.38	29.41	30.3	37.56	15.39
31.2	17.41	11.52	31.2	22.47	7.67	31.3	19.08	33.48	31.3	17.80	29.52	31.3	37.41	15.59
32.2	17.03	11.46	32.2	21.90	7.64	32.3	17.71	33.52	32.3	16.15	29.62	32.3	37.27	15.78
16.96 +16.93			24.58 -24.56			58.80 +58.79			73.87 -73.86			7.40 +7.34		
17 ^h 58 ^m 41 ^s .809			18 ^h 6 ^m 47 ^s .620			19 ^h 1 ^m 27 ^s .463			19 ^h 29 ^m 16 ^s .746			20 ^h 48 ^m 36 ^s .323		
86° 36' 51".12			-87° 39' 51".38			+89° 1' 7".53			-89° 13' 21".02			+82° 13' 43".34		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Sept.	21 38	-83 5	Sept.	22 16	-86 22	Sept.	22 37	-81 48	Sept.	23 28	+86 51	Sept.	23 47	-82 28
	s	"		s	"		s	"		s	"		s	"
1.5	48.41	36.27	1.5	52.21	50.40	1.5	60.06	21.99	1.5	7.65	34.88	1.5	32.12	0.52
2.5	48.39	36.58	2.5	52.23	50.71	2.5	60.08	22.30	2.5	7.68	35.26	2.5	32.19	0.80
3.5	48.36	36.90	3.5	52.24	51.05	3.5	60.10	22.63	3.5	7.70	35.62	3.5	32.26	1.10
4.4	48.32	37.22	4.5	52.21	51.38	4.5	60.11	22.96	4.5	7.73	35.97	4.5	32.32	1.41
5.4	48.27	37.55	5.5	52.17	51.72	5.5	60.10	23.30	5.5	7.78	36.32	5.5	32.37	1.74
6.4	48.21	37.86	6.5	52.09	52.05	6.5	60.08	23.63	6.5	7.84	36.66	6.5	32.40	2.06
7.4	48.13	38.16	7.5	52.01	52.38	7.5	60.06	23.94	7.5	7.91	37.01	7.5	32.43	2.38
8.4	48.05	38.44	8.5	51.92	52.69	8.5	60.03	24.25	8.5	7.99	37.37	8.5	32.45	2.70
9.4	47.98	38.71	9.5	51.82	52.98	9.5	60.00	24.55	9.5	8.06	37.74	9.5	32.47	3.01
10.4	47.91	38.97	10.5	51.73	53.27	10.5	59.98	24.85	10.5	8.12	38.11	10.5	32.48	3.31
11.4	47.85	39.22	11.5	51.64	53.55	11.5	59.95	25.13	11.5	8.18	38.51	11.5	32.50	3.60
12.4	47.79	39.47	12.5	51.56	53.82	12.5	59.93	25.40	12.5	8.22	38.92	12.5	32.52	3.87
13.4	47.73	39.70	13.4	51.49	54.09	13.5	59.92	25.66	13.5	8.23	39.33	13.5	32.55	4.14
14.4	47.68	39.96	14.4	51.43	54.37	14.5	59.91	25.92	14.5	8.21	39.75	14.5	32.58	4.41
15.4	47.63	40.23	15.4	51.38	54.65	15.5	59.91	26.20	15.5	8.18	40.17	15.5	32.62	4.69
16.4	47.58	40.52	16.4	51.32	54.94	16.5	59.90	26.51	16.5	8.12	40.56	16.5	32.67	4.98
17.4	47.52	40.81	17.4	51.25	55.25	17.5	59.89	26.82	17.5	8.06	40.95	17.5	32.70	5.29
18.4	47.44	41.10	18.4	51.15	55.56	18.5	59.86	27.15	18.5	8.00	41.32	18.5	32.72	5.61
19.4	47.34	41.39	19.4	51.03	55.88	19.4	59.82	27.47	19.5	7.95	41.68	19.5	32.73	5.95
20.4	47.24	41.69	20.4	50.88	56.20	20.4	59.77	27.79	20.5	7.93	42.03	20.5	32.72	6.29
21.4	47.12	41.95	21.4	50.71	56.50	21.4	59.71	28.09	21.5	7.93	42.39	21.5	32.70	6.62
22.4	47.00	42.19	22.4	50.52	56.76	22.4	59.65	28.37	22.5	7.94	42.76	22.5	32.67	6.94
23.4	46.88	42.41	23.4	50.34	57.01	23.4	59.58	28.64	23.5	7.94	43.16	23.5	32.64	7.23
24.4	46.78	42.61	24.4	50.17	57.24	24.4	59.52	28.89	24.5	7.92	43.57	24.5	32.61	7.51
25.4	46.69	42.80	25.4	50.01	57.47	25.4	59.47	29.13	25.5	7.89	43.99	25.5	32.60	7.78
26.4	46.60	43.01	26.4	49.87	57.71	26.4	59.42	29.37	26.5	7.83	44.40	26.5	32.60	8.05
27.4	46.51	43.23	27.4	49.74	57.97	27.4	59.38	29.62	27.5	7.74	44.82	27.5	32.60	8.33
28.4	46.43	43.45	28.4	49.62	58.24	28.4	59.34	29.89	28.5	7.62	45.22	28.5	32.60	8.63
29.4	46.34	43.70	29.4	49.48	58.52	29.4	59.29	30.18	29.5	7.49	45.60	29.5	32.59	8.93
30.4	46.23	43.97	30.4	49.32	58.81	30.4	59.24	30.48	30.5	7.35	45.97	30.5	32.57	9.25
31.4	46.11	44.23	31.4	49.15	59.10	31.4	59.17	30.78	31.4	7.22	46.31	31.5	32.55	9.58
32.4	45.98	44.48	32.4	48.95	59.39	32.4	59.09	31.09	32.4	7.11	46.65	32.5	32.52	9.92
8.32 -8.26			15.85 -15.81			7.02 -6.95			18.26 +18.23			7.63 -7.56		
21 ^h 38 ^m 29 ^s .050			22 ^h 16 ^m 20 ^s .949			22 ^h 37 ^m 45 ^s .323			23 ^h 27 ^m 43 ^s .851			23 ^h 47 ^m 20 ^s .032		
-83° 5' 50".66			-86° 23' 9".03			-81° 48' 43".57			+86° 51' 18".76			-82° 28' 28".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 0 57	° ' " +85 49	Oct.	h m 1 32	° ' " +88 52	Oct.	h m 1 42	° ' " -85 10	Oct.	h m 4 10	° ' " +85 20	Oct.	h m 5 35	° ' " +85 9
0.5	43.64	23.75	0.5	20.12	16.09	0.5	7.72	38.12	0.6	48.70	13.63	0.7	55.55	15.70
1.5	43.67	24.11	1.5	20.42	17.03	1.5	7.81	38.44	1.6	48.94	13.83	1.7	55.82	15.78
2.5	43.70	24.45	2.5	20.73	17.37	2.5	7.90	38.76	2.6	49.18	14.03	2.7	56.09	15.86
3.5	43.75	24.78	3.5	21.07	17.70	3.5	7.96	39.10	3.6	49.42	14.22	3.7	56.36	15.93
4.5	43.80	25.12	4.5	21.44	18.04	4.5	8.02	39.46	4.6	49.66	14.41	4.7	56.63	16.00
5.5	43.86	25.48	5.5	21.84	18.37	5.5	8.05	39.81	5.6	49.90	14.58	5.7	56.90	16.06
6.5	43.93	25.84	6.5	22.26	18.73	6.5	8.08	40.15	6.6	50.17	14.76	6.7	57.19	16.13
7.5	43.99	26.21	7.5	22.68	19.09	7.5	8.10	40.49	7.6	50.44	14.97	7.7	57.49	16.19
8.5	44.06	26.58	8.5	23.09	19.45	8.5	8.12	40.81	8.6	50.72	15.19	8.7	57.80	16.26
9.5	44.12	26.99	9.5	23.48	19.83	9.5	8.13	41.13	9.6	51.00	15.41	9.7	58.12	16.34
10.5	44.17	27.39	10.5	23.82	20.23	10.5	8.15	41.42	10.6	51.28	15.64	10.7	58.45	16.45
11.5	44.19	27.80	11.5	24.09	20.64	11.5	8.18	41.71	11.6	51.55	15.91	11.7	58.78	16.58
12.5	44.20	28.21	12.5	24.31	21.04	12.5	8.21	41.99	12.6	51.81	16.19	12.7	59.09	16.73
13.5	44.18	28.60	13.5	24.44	21.45	13.5	8.25	42.28	13.6	52.06	16.47	13.7	59.38	16.89
14.5	44.15	28.99	14.5	24.52	21.84	14.5	8.29	42.58	14.6	52.28	16.75	14.7	59.67	17.06
15.5	44.12	29.37	15.5	24.57	22.22	15.5	8.33	42.90	15.6	52.48	17.03	15.7	59.94	17.22
16.5	44.09	29.73	16.5	24.65	22.59	16.5	8.34	43.23	16.6	52.68	17.29	16.7	60.20	17.37
17.5	44.07	30.07	17.5	24.75	22.94	17.5	8.34	43.59	17.6	52.88	17.54	17.7	60.45	17.51
18.5	44.06	30.41	18.5	24.91	23.28	18.5	8.31	43.95	18.6	53.10	17.78	18.7	60.71	17.62
19.5	44.08	30.77	19.5	25.13	23.63	19.5	8.28	44.30	19.6	53.33	18.00	19.7	60.98	17.73
20.5	44.10	31.13	20.5	25.37	23.99	20.5	8.23	44.64	20.6	53.58	18.23	20.7	61.26	17.84
21.5	44.12	31.51	21.5	25.63	24.37	21.5	8.18	44.96	21.6	53.84	18.46	21.6	61.57	17.96
22.5	44.13	31.90	22.5	25.85	24.77	22.5	8.12	45.26	22.6	54.09	18.73	22.6	61.89	18.10
23.5	44.13	32.31	23.5	26.00	25.18	23.5	8.07	45.55	23.6	54.34	19.01	23.6	62.20	18.27
24.4	44.09	32.72	24.5	26.06	25.60	24.5	8.03	45.83	24.6	54.58	19.33	24.6	62.50	18.47
25.4	44.04	33.13	25.5	26.02	26.03	25.5	7.99	46.12	25.6	54.81	19.65	25.6	62.79	18.67
26.4	43.97	33.52	26.5	25.92	26.43	26.5	7.97	46.42	26.6	55.01	19.98	26.6	63.07	18.89
27.4	43.87	33.88	27.5	25.77	26.81	27.5	7.95	46.73	27.6	55.19	20.30	27.6	63.32	19.11
28.4	43.79	34.22	28.5	25.61	27.17	28.5	7.91	47.05	28.6	55.34	20.60	28.6	63.55	19.33
29.4	43.70	34.55	29.5	25.45	27.51	29.5	7.87	47.38	29.6	55.49	20.89	29.6	63.78	19.53
30.4	43.61	34.88	30.5	25.31	27.85	30.5	7.82	47.73	30.6	55.64	21.17	30.6	64.00	19.71
31.4	43.54	35.20	31.5	25.21	28.19	31.5	7.74	48.09	31.6	55.81	21.45	31.6	64.23	19.88
13.74 +13.70			50.83 +50.82			11.90 -11.86			12.30 +12.26			11.84 +11.80		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .554		
+85° 49' 4''.72			+88° 52' 2''.06			-85° 11' 3''.34			+85° 20' 19''.62			+85° 9' 32''.39		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			ζ Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 5 45	° ' - -84 49	Oct.	h m 6 46	° ' - -80 43	Oct.	h m 7 3	° ' + +87 10	Oct.	h m 7 14	° ' + +82 33	Oct.	h m 7 15	° ' - -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.7	53.22	26.60	0.8	47.91	28.10	0.8	0.73	23.78	0.8	6.93	58.12	0.8	34.36	2.77
1.7	53.47	26.65	1.8	48.05	28.06	1.8	1.20	23.74	1.8	7.11	58.07	1.8	34.77	2.68
2.7	53.72	26.73	2.8	48.19	28.06	2.8	1.68	23.70	2.8	7.29	58.00	2.8	35.19	2.63
3.7	53.97	26.82	3.7	48.33	28.06	3.8	2.14	23.64	3.8	7.47	57.92	3.8	35.63	2.59
4.7	54.22	26.93	4.7	48.48	28.08	4.8	2.60	23.57	4.8	7.64	57.84	4.8	36.06	2.57
5.7	54.47	27.06	5.7	48.63	28.13	5.8	3.08	23.49	5.8	7.82	57.74	5.8	36.50	2.56
6.7	54.70	27.21	6.7	48.78	28.19	6.8	3.57	23.41	6.8	8.01	57.63	6.8	36.93	2.57
7.7	54.93	27.35	7.7	48.91	28.25	7.7	4.07	23.34	7.8	8.20	57.53	7.8	37.34	2.60
8.7	55.15	27.50	8.7	49.05	28.32	8.7	4.59	23.28	8.8	8.40	57.42	8.8	37.74	2.64
9.7	55.35	27.65	9.7	49.19	28.39	9.7	5.15	23.23	9.8	8.62	57.34	9.8	38.12	2.68
10.7	55.55	27.79	10.7	49.32	28.45	10.7	5.72	23.17	10.7	8.84	57.29	10.8	38.49	2.70
11.7	55.76	27.93	11.7	49.45	28.51	11.7	6.29	23.14	11.7	9.07	57.25	11.7	38.86	2.72
12.7	55.96	28.05	12.7	49.58	28.56	12.7	6.86	23.13	12.7	9.29	57.21	12.7	39.22	2.72
13.7	56.18	28.16	13.7	49.70	28.60	13.7	7.41	23.16	13.7	9.51	57.21	13.7	39.59	2.70
14.7	56.39	28.28	14.7	49.84	28.64	14.7	7.95	23.19	14.7	9.71	57.20	14.7	39.97	2.69
15.7	56.61	28.40	15.7	49.97	28.69	15.7	8.46	23.22	15.7	9.90	57.21	15.7	40.38	2.69
16.7	56.84	28.54	16.7	50.11	28.77	16.7	8.95	23.23	16.7	10.10	57.21	16.7	40.79	2.73
17.7	57.07	28.71	17.7	50.25	28.86	17.7	9.41	23.24	17.7	10.28	57.19	17.7	41.22	2.78
18.7	57.29	28.92	18.7	50.39	28.99	18.7	9.88	23.23	18.7	10.46	57.16	18.7	41.66	2.86
19.7	57.49	29.14	19.7	50.54	29.14	19.7	10.37	23.21	19.7	10.64	57.12	19.7	42.08	2.96
20.7	57.69	29.37	20.7	50.67	29.31	20.7	10.87	23.18	20.7	10.84	57.07	20.7	42.50	3.09
21.7	57.88	29.61	21.7	50.80	29.49	21.7	11.41	23.15	21.7	11.06	57.02	21.7	42.87	3.22
22.7	58.06	29.84	22.7	50.92	29.64	22.7	11.99	23.14	22.7	11.28	56.98	22.7	43.24	3.35
23.7	58.22	30.04	23.7	51.04	29.78	23.7	12.56	23.16	23.7	11.51	56.97	23.7	43.58	3.45
24.6	58.39	30.24	24.7	51.16	29.92	24.7	13.15	23.20	24.7	11.73	56.99	24.7	43.91	3.55
25.6	58.56	30.43	25.7	51.28	30.05	25.7	13.71	23.28	25.7	11.96	57.03	25.7	44.27	3.63
26.6	58.74	30.61	26.7	51.39	30.16	26.7	14.24	23.36	26.7	12.16	57.08	26.7	44.63	3.71
27.6	58.93	30.80	27.7	51.52	30.28	27.7	14.76	23.45	27.7	12.36	57.15	27.7	45.00	3.79
28.6	59.12	31.02	28.7	51.65	30.42	28.7	15.23	23.55	28.7	12.55	57.22	28.7	45.40	3.87
29.6	59.32	31.24	29.7	51.78	30.58	29.7	15.70	23.62	29.7	12.73	57.28	29.7	45.81	3.98
30.6	59.52	31.48	30.7	51.91	30.75	30.7	16.15	23.70	30.7	12.91	57.33	30.7	46.22	4.11
31.6	59.71	31.75	31.7	52.04	30.95	31.7	16.59	23.76	31.7	13.09	57.39	31.7	46.63	4.25
11.09 -11.04			6.20 -6.12			20.28 +20.25			7.73 +7.66			18.50 -18.47		
5 ^h 46 ^m 3 ^s .075			6 ^h 46 ^m 53 ^s .600			7 ^h 2 ^m 33 ^s .206			7 ^h 13 ^m 55 ^s .106			7 ^h 16 ^m 0 ^s .004		
-84° 49' 45".59			-80° 43' 42".15			+87° 10' 49".32			+82° 34' 23".73			-86° 54' 13".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleonis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Oct.	8 17	+88 52	Oct.	9 8	-85 20	Oct.	9 25	+81 40	Oct.	9 36	-80 34	Oct.	10 21	+82 57
	s	"		s	"		s	"		s	"		s	"
0.8	21.19	18.97	0.9	32.17	13.71	0.9	33.52	55.56	0.9	13.90	27.16	0.9	11.24	66.42
1.8	22.28	18.82	1.9	32.40	13.49	1.9	33.63	55.32	1.9	13.98	26.91	1.9	11.35	66.13
2.8	23.35	18.65	2.8	32.62	13.26	2.9	33.74	55.08	2.9	14.08	26.66	2.9	11.45	65.84
3.8	24.38	18.49	3.8	32.86	13.06	3.9	33.85	54.84	3.9	14.19	26.43	3.9	11.54	65.55
4.8	25.41	18.32	4.8	33.11	12.87	4.9	33.97	54.58	4.9	14.30	26.22	4.9	11.63	65.24
5.8	26.46	18.14	5.8	33.36	12.71	5.9	34.08	54.32	5.9	14.43	26.03	5.9	11.73	64.92
6.8	27.53	17.95	6.8	33.61	12.56	6.9	34.21	54.05	6.9	14.55	25.84	6.9	11.83	64.60
7.8	28.65	17.76	7.8	33.87	12.43	7.8	34.33	53.76	7.9	14.67	25.67	7.9	11.93	64.26
8.8	29.82	17.57	8.8	34.12	12.32	8.8	34.47	53.47	8.9	14.80	25.53	8.9	12.06	63.92
9.8	31.05	17.38	9.8	34.35	12.21	9.8	34.61	53.19	9.8	14.90	25.39	9.9	12.18	63.58
10.8	32.33	17.21	10.8	34.58	12.11	10.8	34.76	52.90	10.8	15.01	25.25	10.9	12.32	63.24
11.8	33.65	17.06	11.8	34.80	11.99	11.8	34.93	52.63	11.8	15.12	25.11	11.9	12.47	62.90
12.8	34.98	16.93	12.8	35.02	11.86	12.8	35.09	52.40	12.8	15.23	24.96	12.9	12.63	62.58
13.8	36.30	16.82	13.8	35.24	11.72	13.8	35.26	52.17	13.8	15.33	24.80	13.9	12.79	62.29
14.8	37.59	16.72	14.8	35.47	11.57	14.8	35.41	51.96	14.8	15.44	24.62	14.9	12.93	62.01
15.8	38.82	16.63	15.8	35.71	11.43	15.8	35.56	51.76	15.8	15.55	24.45	15.9	13.09	61.74
16.8	40.00	16.54	16.8	35.97	11.29	16.8	35.70	51.57	16.8	15.68	24.28	16.9	13.22	61.49
17.8	41.12	16.43	17.8	36.24	11.18	17.8	35.84	51.38	17.8	15.81	24.14	17.9	13.36	61.22
18.8	42.24	16.30	18.8	36.51	11.07	18.8	35.97	51.16	18.8	15.94	24.02	18.9	13.48	60.95
19.8	43.38	16.17	19.8	36.80	11.01	19.8	36.11	50.94	19.8	16.08	23.91	19.9	13.60	60.67
20.8	44.55	16.03	20.8	37.09	10.96	20.8	36.24	50.70	20.8	16.22	23.83	20.9	13.73	60.35
21.8	45.80	15.88	21.8	37.37	10.92	21.8	36.40	50.45	21.8	16.36	23.77	21.8	13.87	60.02
22.8	47.13	15.74	22.8	37.64	10.89	22.8	36.56	50.20	22.8	16.50	23.72	22.8	14.03	59.70
23.8	48.51	15.63	23.8	37.87	10.88	23.8	36.74	49.96	23.8	16.63	23.67	23.8	14.21	59.39
24.8	49.90	15.53	24.8	38.12	10.85	24.8	36.93	49.74	24.8	16.75	23.62	24.8	14.38	59.10
25.8	51.30	15.48	25.8	38.36	10.80	25.8	37.11	49.54	25.8	16.87	23.53	25.8	14.57	58.83
26.7	52.66	15.44	26.8	38.60	10.72	26.8	37.29	49.37	26.8	16.99	23.45	26.8	14.75	58.58
27.7	53.94	15.40	27.8	38.86	10.65	27.8	37.46	49.23	27.8	17.12	23.35	27.8	14.93	58.36
28.7	55.18	15.38	28.8	39.12	10.59	28.8	37.61	49.10	28.8	17.24	23.25	28.8	15.09	58.14
29.7	56.36	15.35	29.8	39.39	10.54	29.8	37.76	48.96	29.8	17.38	23.17	29.8	15.25	57.92
30.7	57.53	15.32	30.8	39.68	10.51	30.8	37.91	48.81	30.8	17.51	23.09	30.8	15.39	57.72
31.7	58.65	15.28	31.8	39.98	10.49	31.8	38.05	48.68	31.8	17.66	23.03	31.8	15.54	57.50
50.77	+50.76		12.30	-12.26		6.91	+6.84		6.11	-6.02		8.17	+8.11	
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
+88° 52' 49".08			-85° 20' 12".12			+81° 41' 25".82			-80° 34' 23".04			+82° 58' 35".87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

77 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			1 Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Oct.	10 59	-84 9	Oct.	12 13	+88 8	Oct.	12 46	-84 40	Oct.	12 48	+83 51	Oct.	13 27	-85 22
	s	"		s	"		s	"		s	"		s	"
0.9	44.17	23.00	0.9	47.54	53.36	1.0	7.10	63.11	1.0	18.78	12.16	1.0	19.64	24.09
1.9	44.24	22.68	1.9	47.60	53.00	2.0	7.08	62.77	2.0	18.75	11.79	2.0	19.57	23.77
2.9	44.34	22.36	2.9	47.65	52.67	2.9	7.08	62.42	3.0	18.73	11.45	3.0	19.51	23.44
3.9	44.44	22.05	3.9	47.68	52.32	3.9	7.08	62.06	3.9	18.71	11.11	4.0	19.46	23.07
4.9	44.57	21.77	4.9	47.69	51.96	4.9	7.10	61.72	4.9	18.69	10.75	5.0	19.43	22.72
5.9	44.70	21.49	5.9	47.70	51.61	5.9	7.14	61.38	5.9	18.66	10.39	6.0	19.43	22.38
6.9	44.83	21.22	6.9	47.70	51.25	6.9	7.18	61.05	6.9	18.63	10.02	7.0	19.43	22.05
7.9	44.97	20.94	7.9	47.72	50.87	7.9	7.23	60.74	7.9	18.60	9.64	8.0	19.44	21.73
8.9	45.11	20.70	8.9	47.76	50.46	8.9	7.29	60.43	8.9	18.59	9.26	9.0	19.47	21.42
9.9	45.24	20.47	9.9	47.83	50.06	9.9	7.35	60.15	9.9	18.58	8.85	10.0	19.48	21.14
10.9	45.37	20.25	10.9	47.94	49.65	10.9	7.40	59.88	10.9	18.58	8.43	11.0	19.49	20.85
11.9	45.49	20.02	11.9	48.10	49.24	11.9	7.44	59.60	11.9	18.61	8.02	12.0	19.50	20.56
12.9	45.61	19.78	12.9	48.30	48.84	12.9	7.48	59.32	12.9	18.64	7.61	13.0	19.50	20.27
13.9	45.72	19.55	13.9	48.53	48.45	13.9	7.52	59.04	13.9	18.67	7.20	13.9	19.49	19.97
14.9	45.84	19.30	14.9	48.78	48.07	14.9	7.55	58.74	14.9	18.71	6.81	14.9	19.48	19.66
15.0	45.97	19.05	15.9	49.01	47.72	15.9	7.58	58.42	15.9	18.75	6.44	15.9	19.48	19.35
16.9	46.10	18.79	16.9	49.21	47.38	16.9	7.62	58.10	16.9	18.79	6.07	16.9	19.48	19.02
17.9	46.26	18.53	17.9	49.39	47.05	17.9	7.71	57.76	17.9	18.79	5.71	17.9	19.51	18.66
18.9	46.43	18.28	18.9	49.53	46.70	18.9	7.80	57.42	18.9	18.81	5.36	18.9	19.56	18.32
19.9	46.61	18.05	19.9	49.65	46.34	19.9	7.92	57.10	19.9	18.81	5.00	19.9	19.65	17.98
20.9	46.80	17.87	20.9	49.76	45.97	20.9	8.04	56.81	20.9	18.81	4.62	20.9	19.74	17.66
21.9	46.99	17.70	21.9	49.91	45.57	21.9	8.16	56.53	21.9	18.84	4.22	21.9	19.84	17.36
22.9	47.17	17.54	22.9	50.11	45.17	22.9	8.28	56.28	22.9	18.86	3.81	22.9	19.94	17.08
23.9	47.34	17.38	23.9	50.35	44.75	23.9	8.40	56.04	23.9	18.91	3.39	23.9	20.03	16.82
24.9	47.50	17.21	24.9	50.64	44.35	24.9	8.50	55.81	24.9	18.97	2.97	24.9	20.11	16.56
25.9	47.65	17.05	25.9	50.99	43.97	25.9	8.59	55.56	25.9	19.05	2.55	25.9	20.16	16.29
26.9	47.80	16.87	26.9	51.35	43.62	26.9	8.67	55.29	26.9	19.12	2.18	26.9	20.22	16.01
27.9	47.97	16.68	27.9	51.71	43.27	27.9	8.76	55.01	27.9	19.20	1.80	27.9	20.27	15.69
28.9	48.13	16.46	28.9	52.05	42.94	28.9	8.85	54.70	28.9	19.28	1.46	28.9	20.33	15.38
29.9	48.30	16.26	29.9	52.39	42.62	29.9	8.97	54.39	29.9	19.35	1.12	29.9	20.41	15.07
30.8	48.49	16.07	30.9	52.70	42.31	30.9	9.09	54.09	30.9	19.41	0.79	30.9	20.50	14.75
31.8	48.68	15.89	31.9	52.98	42.01	31.9	9.22	53.78	31.9	19.47	0.47	31.9	20.61	14.41
9.82 -9.77			30.92 +30.90			10.79 -10.75			9.34 +9.28			12.39 -12.35		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
-84° 9' 9".97			+88° 9' 16".14			-84° 40' 41".95			+83° 51' 30".88			-85° 22' 0".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m s	° '		h m s	° '		h m s	° '		h m s	° '		h m s	° '
Oct.	14 13	−83 17	Oct.	15 2	+87 32	Oct.	15 24	−84 11	Oct.	16 54	+82 10	Oct.	17 16	−80 47
1.1	38.05	61.98	1.1	36.06	54.29	1.1	15.83	67.14	1.2	8.41	40.38	1.2	15.60	29.33
2.1	37.96	61.66	2.1	35.73	54.00	2.1	15.68	66.88	2.2	8.24	40.23	2.2	15.47	29.23
3.1	37.88	61.34	3.1	35.39	53.74	3.1	15.54	66.62	3.2	8.08	40.09	3.2	15.33	29.10
4.1	37.82	61.01	4.1	35.03	53.47	4.1	15.39	66.35	4.2	7.92	39.96	4.2	15.20	28.96
5.1	37.76	60.68	5.1	34.67	53.21	5.1	15.25	66.06	5.2	7.76	39.85	5.2	15.07	28.81
6.1	37.71	60.35	6.1	34.30	52.95	6.1	15.14	65.78	6.2	7.59	39.72	6.2	14.95	28.64
7.0	37.67	60.02	7.1	33.92	52.68	7.1	15.04	65.49	7.2	7.43	39.59	7.2	14.84	28.46
8.0	37.64	59.70	8.1	33.53	52.38	8.1	14.95	65.19	8.2	7.26	39.45	8.2	14.74	28.28
9.0	37.62	59.42	9.1	33.15	52.06	9.1	14.86	64.92	9.2	7.09	39.29	9.2	14.64	28.10
10.0	37.60	59.12	10.1	32.77	51.75	10.1	14.77	64.66	10.2	6.92	39.12	10.2	14.54	27.95
11.0	37.58	58.85	11.1	32.42	51.41	11.1	14.69	64.42	11.1	6.75	38.91	11.2	14.45	27.80
12.0	37.56	58.58	12.1	32.09	51.05	12.1	14.60	64.18	12.1	6.58	38.69	12.2	14.35	27.67
13.0	37.53	58.31	13.1	31.78	50.68	13.1	14.52	63.94	13.1	6.44	38.47	13.2	14.26	27.54
14.0	37.49	58.02	14.1	31.50	50.33	14.1	14.42	63.69	14.1	6.29	38.23	14.2	14.17	27.41
15.0	37.45	57.75	15.1	31.26	49.98	15.1	14.31	63.43	15.1	6.14	38.00	15.2	14.06	27.27
16.0	37.41	57.44	16.1	31.02	49.65	16.1	14.21	63.16	16.1	5.99	37.77	16.2	13.94	27.09
17.0	37.38	57.10	17.1	30.78	49.32	17.1	14.10	62.85	17.1	5.85	37.56	17.1	13.82	26.91
18.0	37.36	56.75	18.1	30.51	49.01	18.1	14.01	62.53	18.1	5.71	37.37	18.1	13.70	26.69
19.0	37.35	56.41	19.1	30.24	48.70	19.1	13.95	62.19	19.1	5.57	37.18	19.1	13.60	26.46
20.0	37.37	56.06	20.0	29.92	48.39	20.1	13.89	61.86	20.1	5.42	37.00	20.1	13.50	26.22
21.0	37.40	55.73	21.0	29.60	48.07	21.1	13.85	61.54	21.1	5.26	36.81	21.1	13.43	25.97
22.0	37.44	55.41	22.0	29.28	47.72	22.1	13.82	61.24	22.1	5.11	36.59	22.1	13.36	25.73
23.0	37.48	55.13	23.0	28.99	47.37	23.1	13.82	60.96	23.1	4.95	36.36	23.1	13.30	25.50
24.0	37.51	54.85	24.0	28.71	46.99	24.1	13.79	60.69	24.1	4.80	36.10	24.1	13.24	25.27
25.0	37.55	54.59	25.0	28.47	46.60	25.0	13.75	60.42	25.1	4.65	35.83	25.1	13.16	25.09
25.9	37.55	54.32	26.0	28.27	46.21	26.0	13.71	60.15	26.1	4.52	35.54	26.1	13.09	24.90
26.9	37.55	54.03	27.0	28.11	45.82	27.0	13.68	59.87	27.1	4.39	35.25	27.1	13.01	24.71
27.9	37.56	53.72	28.0	27.97	45.44	28.0	13.60	59.57	28.1	4.27	34.96	28.1	12.92	24.49
28.9	37.56	53.41	29.0	27.83	45.10	29.0	13.54	59.25	29.1	4.15	34.69	29.1	12.82	24.27
29.9	37.57	53.08	30.0	27.69	44.77	30.0	13.49	58.92	30.1	4.03	34.42	30.1	12.73	24.04
30.9	37.60	52.73	31.0	27.54	44.44	31.0	13.45	58.59	31.1	3.93	34.18	31.1	12.64	23.77
31.9	37.63	52.37	32.0	27.38	44.11	32.0	13.41	58.25	32.1	3.81	33.94	32.1	12.55	23.50
8.57	−8.51		23.37	+23.34		9.90	−9.85		7.35	+7.28		6.25	−6.17	
14 ^h 13 ^m	37°.066		15 ^h 3 ^m	21°.809		15 ^h 24 ^m	9°.966		16 ^h 54 ^m	19°.238		17 ^h 16 ^m	6°.064	
−83° 17′	37″.78		+87° 32′	56″.60		−84° 11′	42″.92		+82° 10′	27″.09		−80° 47′	10″.43	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 17 58	° ' " +86 37	Oct.	h m 18 7	° ' " -87 40	Oct.	h m 18 59	° ' " +89 1	Oct.	h m 19 30	° ' " -89 13	Oct.	h m 20 48	° ' " +82 14
	s 17.41	" 11.52		s 22.47	" 7.67		s 79.08	" 33.48		s 77.80	" 29.52		s 37.41	" 15.50
1.2	17.41	11.52	1.2	22.47	7.67	1.3	79.08	33.48	1.3	77.80	29.52	1.3	37.41	15.50
2.2	17.03	11.46	2.2	21.90	7.64	2.3	77.71	33.52	2.3	76.15	29.62	2.3	37.27	15.78
3.2	16.64	11.42	3.2	21.33	7.58	3.3	76.36	33.56	3.3	74.44	29.70	3.3	37.13	15.96
4.2	16.24	11.38	4.2	20.76	7.51	4.3	75.01	33.62	4.3	72.72	29.76	4.3	36.99	16.19
5.2	15.84	11.34	5.2	20.20	7.43	5.3	73.65	33.69	5.3	71.00	29.81	5.3	36.86	16.41
6.2	15.43	11.33	6.2	19.67	7.33	6.3	72.26	33.77	6.3	69.30	29.82	6.3	36.72	16.63
7.2	15.02	11.30	7.2	19.15	7.22	7.2	70.83	33.85	7.3	67.65	29.83	7.3	36.58	16.86
8.2	14.60	11.26	8.2	18.67	7.11	8.2	69.36	33.91	8.3	66.07	29.82	8.3	36.43	17.09
9.2	14.16	11.22	9.2	18.20	6.99	9.2	67.82	33.97	9.3	64.55	29.80	9.3	36.29	17.31
10.2	13.71	11.14	10.2	17.76	6.88	10.2	66.24	34.02	10.3	63.08	29.79	10.3	36.12	17.54
11.2	13.26	11.06	11.2	17.32	6.78	11.2	64.62	34.03	11.3	61.68	29.79	11.3	35.95	17.74
12.2	12.81	10.94	12.2	16.89	6.68	12.2	63.00	34.05	12.3	60.28	29.81	12.3	35.79	17.93
13.2	12.39	10.81	13.2	16.45	6.60	13.2	61.39	34.02	13.3	58.87	29.84	13.3	35.61	18.10
14.2	11.96	10.67	14.2	15.99	6.53	14.2	59.84	33.98	14.2	57.41	29.87	14.3	35.44	18.25
15.2	11.57	10.53	15.2	15.49	6.45	15.2	58.34	33.95	15.2	55.86	29.91	15.3	35.26	18.38
16.2	11.18	10.40	16.2	14.98	6.35	16.2	56.92	33.92	16.2	54.22	29.91	16.3	35.09	18.51
17.2	10.81	10.29	17.2	14.46	6.21	17.2	55.55	33.89	17.2	52.51	29.90	17.3	34.94	18.63
18.2	10.43	10.18	18.2	13.94	6.04	18.2	54.19	33.88	18.2	50.76	29.86	18.3	34.79	18.76
19.2	10.05	10.09	19.2	13.45	5.86	19.2	52.82	33.88	19.2	49.04	29.79	19.3	34.65	18.93
20.2	9.65	10.00	20.2	12.97	5.67	20.2	51.40	33.89	20.2	47.38	29.69	20.3	34.50	19.10
21.2	9.24	9.92	21.2	12.55	5.47	21.2	49.91	33.91	21.2	45.82	29.59	21.3	34.34	19.29
22.2	8.82	9.81	22.2	12.17	5.26	22.2	48.34	33.93	22.2	44.36	29.49	22.3	34.17	19.47
23.2	8.39	9.69	23.2	11.81	5.06	23.2	46.72	33.91	23.2	43.00	29.40	23.3	34.00	19.64
24.2	7.96	9.55	24.2	11.45	4.88	24.2	45.09	33.87	24.2	41.68	29.31	24.3	33.82	19.78
25.2	7.53	9.37	25.2	11.09	4.73	25.2	43.48	33.80	25.2	40.34	29.25	25.3	33.64	19.90
26.2	7.13	9.17	26.2	10.70	4.59	26.2	41.93	33.71	26.2	38.97	29.19	26.3	33.45	20.00
27.1	6.75	8.98	27.2	10.28	4.44	27.2	40.45	33.62	27.2	37.50	29.14	27.3	33.27	20.06
28.1	6.38	8.78	28.2	9.84	4.27	28.2	39.03	33.52	28.2	35.96	29.08	28.3	33.09	20.12
29.1	6.05	8.59	29.2	9.39	4.10	29.2	37.68	33.42	29.2	34.35	29.01	29.3	32.92	20.17
30.1	5.72	8.42	30.1	8.92	3.89	30.2	36.37	33.33	30.2	32.69	28.92	30.3	32.76	20.23
31.1	5.39	8.24	31.1	8.46	3.67	31.2	35.08	33.25	31.2	31.01	28.80	31.3	32.60	20.29
32.1	5.06	8.08	32.1	8.03	3.44	32.2	33.80	33.17	32.2	29.34	28.67	32.3	32.44	20.37
16.96 +16.93			24.58 -24.56			58.84 +58.83			73.93 -73.92			7.40 +7.34		
17 ^h 58 ^m 41 ^s .809			18 ^h 6 ^m 47 ^s .620			19 ^h 1 ^m 27 ^s .463			19 ^h 29 ^m 16 ^s .746			20 ^h 48 ^m 36 ^s .323		
+86° 36' 51".12			-87° 39' 51".38			+89° 1' 7".53			-89° 13' 21".02			+82° 13' 43".34		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ ¹ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Oct.	21 38	-83 5	Oct.	22 16	-86 22	Oct.	22 37	-81 48	Oct.	23 28	+86 51	Oct.	23 47	-82 28
	s	"		s	"		s	"		s	"		s	"
1.4	46.11	44.23	1.4	49.15	59.10	1.4	59.17	30.78	1.4	7.22	46.31	1.5	32.55	9.58
2.4	45.98	44.48	2.4	48.95	59.39	2.4	59.09	31.09	2.4	7.11	46.65	2.5	32.52	9.92
3.4	45.84	44.73	3.4	48.72	59.67	3.4	59.01	31.39	3.4	7.01	46.98	3.5	32.47	10.26
4.4	45.69	44.96	4.4	48.48	59.93	4.4	58.91	31.68	4.4	6.92	47.32	4.5	32.42	10.60
5.4	45.53	45.17	5.4	48.23	60.18	5.4	58.81	31.96	5.4	6.82	47.67	5.5	32.36	10.93
6.4	45.38	45.36	6.4	47.97	60.42	6.4	58.71	32.21	6.4	6.73	48.01	6.4	32.29	11.25
7.4	45.23	45.55	7.4	47.71	60.64	7.4	58.62	32.45	7.4	6.64	48.37	7.4	32.22	11.55
8.4	45.09	45.72	8.4	47.46	60.85	8.4	58.51	32.69	8.4	6.55	48.76	8.4	32.15	11.84
9.4	44.95	45.88	9.4	47.21	61.05	9.4	58.42	32.91	9.4	6.43	49.16	9.4	32.09	12.12
10.3	44.82	46.03	10.4	47.00	61.25	10.4	58.33	33.12	10.4	6.30	49.56	10.4	32.04	12.38
11.3	44.69	46.19	11.4	46.79	61.45	11.4	58.25	33.34	11.4	6.13	49.95	11.4	31.99	12.65
12.3	44.57	46.36	12.4	46.57	61.65	12.4	58.17	33.57	12.4	5.95	50.33	12.4	31.95	12.93
13.3	44.45	46.53	13.4	46.36	61.86	13.4	58.09	33.79	13.4	5.74	50.69	13.4	31.90	13.20
14.3	44.32	46.72	14.4	46.15	62.08	14.4	58.01	34.03	14.4	5.52	51.03	14.4	31.85	13.48
15.3	44.18	46.91	15.4	45.92	62.31	15.4	57.93	34.29	15.4	5.30	51.36	15.4	31.79	13.78
16.3	44.03	47.11	16.4	45.66	62.53	16.4	57.82	34.54	16.4	5.10	51.67	16.4	31.71	14.09
17.3	43.86	47.30	17.4	45.38	62.75	17.4	57.70	34.79	17.4	4.91	51.98	17.4	31.63	14.39
18.3	43.69	47.45	18.4	45.07	62.95	18.4	57.58	35.02	18.4	4.75	52.29	18.4	31.54	14.69
19.3	43.51	47.59	19.4	44.75	63.14	19.4	57.45	35.23	19.4	4.60	52.62	19.4	31.44	14.99
20.3	43.33	47.69	20.3	44.42	63.31	20.4	57.32	35.43	20.4	4.45	52.97	20.4	31.33	15.26
21.3	43.17	47.78	21.3	44.10	63.45	21.4	57.20	35.59	21.4	4.29	53.33	21.4	31.22	15.51
22.3	43.01	47.85	22.3	43.80	63.56	22.4	57.08	35.74	22.4	4.11	53.70	22.4	31.12	15.74
23.3	42.86	47.93	23.3	43.54	63.68	23.4	56.97	35.89	23.4	3.91	54.07	23.4	31.03	15.96
24.3	42.72	48.00	24.3	43.29	63.80	24.4	56.87	36.04	24.4	3.68	54.42	24.4	30.94	16.18
25.3	42.59	48.10	25.3	43.04	63.93	25.3	56.77	36.21	25.4	3.42	54.77	25.4	30.86	16.41
26.3	42.44	48.21	26.3	42.78	64.09	26.3	56.66	36.38	26.4	3.15	55.09	26.4	30.78	16.64
27.3	42.29	48.32	27.3	42.51	64.26	27.3	56.56	36.56	27.4	2.86	55.39	27.4	30.70	16.89
28.3	42.13	48.44	28.3	42.22	64.43	28.3	56.44	36.74	28.4	2.58	55.68	28.4	30.60	17.16
29.3	41.95	48.56	29.3	41.91	64.59	29.3	56.31	36.93	29.4	2.31	55.96	29.4	30.50	17.43
30.3	41.77	48.67	30.3	41.59	64.74	30.3	56.17	37.12	30.4	2.06	56.23	30.4	30.38	17.70
31.3	41.58	48.77	31.3	41.24	64.89	31.3	56.03	37.31	31.4	1.81	56.49	31.4	30.26	17.98
32.3	41.39	48.85	32.3	40.88	65.01	32.3	55.88	37.50	32.4	1.57	56.76	32.4	30.13	18.23
8.32 -8.26			15.86 -15.82			7.02 -6.95			18.28 +18.25			7.63 -7.56		
21 ^h 38 ^m 29 ^s .050			22 ^h 16 ^m 20 ^s .949			22 ^h 37 ^m 45 ^s .323			23 ^h 27 ^m 43 ^s .851			23 ^h 47 ^m 20 ^s .032		
-83° 5' 50".66			-86° 23' 9".03			-81° 48' 43".57			+86° 51' 18".76			-82° 28' 28".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 94 Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Nov.	0 57	+85 49	Nov.	1 32	+88 52	Nov.	1 42	-85 10	Nov.	4 10	+85 20	Nov.	5 36	+85
	s	"		s	"		s	"		s	"		s	"
0.4	43.54	35.20	0.5	25.21	28.19	0.5	7.74	48.09	0.6	55.81	21.45	0.6	4.23	19.
1.4	43.47	35.51	1.4	25.13	28.53	1.5	7.65	48.44	1.6	55.98	21.72	1.6	4.45	20.
2.4	43.41	35.83	2.4	25.07	28.88	2.5	7.55	48.78	2.6	56.15	21.98	2.6	4.68	20.
3.4	43.35	36.18	3.4	25.02	29.22	3.5	7.44	49.11	3.6	56.32	22.24	3.6	4.92	20.
4.4	43.30	36.53	4.4	24.96	29.57	4.4	7.32	49.43	4.6	56.51	22.52	4.6	5.18	20.
5.4	43.24	36.89	5.4	24.88	29.94	5.4	7.20	49.72	5.6	56.70	22.83	5.6	5.44	20.
6.4	43.16	37.26	6.4	24.77	30.32	6.4	7.08	50.00	6.5	56.89	23.14	6.6	5.70	21.
7.4	43.07	37.64	7.4	24.60	30.72	7.4	6.97	50.27	7.5	57.07	23.47	7.6	5.95	21.
8.4	42.97	38.01	8.4	24.35	31.11	8.4	6.87	50.54	8.5	57.24	23.81	8.6	6.20	21.
9.4	42.83	38.37	9.4	24.04	31.49	9.4	6.78	50.80	9.5	57.39	24.17	9.6	6.44	21.
10.4	42.69	38.71	10.4	23.66	31.87	10.4	6.68	51.08	10.5	57.52	24.53	10.6	6.67	22.
11.4	42.53	39.04	11.4	23.24	32.22	11.4	6.58	51.36	11.5	57.64	24.88	11.6	6.87	22.
12.4	42.37	39.34	12.4	22.81	32.56	12.4	6.48	51.66	12.5	57.74	25.22	12.6	7.07	22.
13.4	42.22	39.63	13.4	22.40	32.89	13.4	6.36	51.97	13.5	57.83	25.53	13.6	7.25	22.
14.4	42.08	39.92	14.4	22.05	33.20	14.4	6.22	52.28	14.5	57.93	25.83	14.6	7.42	23.
15.4	41.97	40.21	15.4	21.77	33.50	15.4	6.06	52.61	15.5	58.05	26.12	15.6	7.61	23.
16.4	41.86	40.51	16.4	21.52	33.82	16.4	5.89	52.91	16.5	58.18	26.39	16.6	7.82	23.
17.4	41.76	40.83	17.4	21.30	34.16	17.4	5.70	53.18	17.5	58.33	26.70	17.6	8.04	23.
18.4	41.66	41.16	18.4	21.05	34.52	18.4	5.51	53.43	18.5	58.48	27.01	18.6	8.27	23.
19.4	41.54	41.50	19.4	20.74	34.89	19.4	5.33	53.66	19.5	58.62	27.34	19.6	8.50	24.
20.4	41.39	41.84	20.4	20.35	35.28	20.4	5.16	53.88	20.5	58.76	27.70	20.6	8.73	24.
21.4	41.22	42.18	21.4	19.86	35.65	21.4	5.00	54.09	21.5	58.88	28.07	21.6	8.94	24.
22.4	41.04	42.50	22.4	19.32	36.00	22.4	4.85	54.30	22.5	58.98	28.44	22.6	9.14	25.
23.4	40.84	42.80	23.4	18.71	36.33	23.4	4.71	54.53	23.5	59.04	28.81	23.6	9.31	25.
24.4	40.63	43.08	24.4	18.05	36.65	24.4	4.56	54.76	24.5	59.10	29.15	24.6	9.46	25.
25.4	40.43	43.33	25.4	17.41	36.94	25.4	4.40	55.03	25.5	59.14	29.49	25.6	9.60	26.
26.4	40.22	43.58	26.4	16.80	37.22	26.4	4.22	55.29	26.5	59.18	29.81	26.6	9.73	26.
27.4	40.02	43.82	27.4	16.20	37.49	27.4	4.04	55.56	27.5	59.22	30.12	27.5	9.86	26.
28.4	39.83	44.05	28.4	15.64	37.75	28.4	3.84	55.83	28.5	59.25	30.42	28.5	9.98	26.
29.4	39.65	44.28	29.4	15.11	38.01	29.4	3.62	56.08	29.5	59.30	30.72	29.5	10.11	27.
30.3	39.48	44.52	30.4	14.59	38.29	30.4	3.40	56.32	30.5	59.35	31.01	30.5	10.25	27.
31.3	39.31	44.77	31.4	14.06	38.58	31.4	3.17	56.54	31.5	59.41	31.32	31.5	10.40	27.
13.74 +13.71			50.98 +50.97			11.90 -11.86			12.31 +12.27			11.84 +11.80		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .5		
+85° 49' 4".72			+88° 52' 2".06			-85° 11' 3".34			+85° 20' 19".62			+85° 9' 32".5		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			ζ Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m 5 45	° ' " -84 49	Nov.	h m 6 46	° ' " -80 43	Nov.	h m 7 3	° ' " +87 10	Nov.	h m 7 14	° ' " +82 38	Nov.	h m 7 15	° ' " -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.6	59.71	31.75	0.7	52.04	30.95	0.7	16.59	23.76	0.7	13.09	57.39	0.7	46.63	4.25
1.6	59.89	32.02	1.7	52.17	31.16	1.7	17.04	23.82	1.7	13.26	57.44	1.7	47.04	4.42
2.6	60.06	32.30	2.7	52.30	31.38	2.7	17.50	23.88	2.7	13.44	57.47	2.7	47.42	4.60
3.6	60.23	32.59	3.7	52.42	31.61	3.7	17.98	23.93	3.7	13.63	57.50	3.7	47.80	4.79
4.6	60.37	32.88	4.7	52.54	31.85	4.7	18.47	24.00	4.7	13.81	57.54	4.7	48.16	4.99
5.6	60.51	33.17	5.7	52.64	32.09	5.7	18.97	24.08	5.7	14.01	57.58	5.7	48.51	5.19
6.6	60.65	33.45	6.7	52.75	32.33	6.7	19.50	24.16	6.7	14.23	57.64	6.7	48.84	5.38
7.6	60.77	33.73	7.7	52.85	32.56	7.7	20.02	24.25	7.7	14.44	57.72	7.7	49.16	5.57
8.6	60.91	33.99	8.6	52.95	32.77	8.7	20.55	24.38	8.7	14.65	57.82	8.7	49.46	5.75
9.6	61.04	34.25	9.6	53.05	32.99	9.7	21.07	24.53	9.7	14.85	57.95	9.7	49.77	5.91
10.6	61.16	34.49	10.6	53.16	33.18	10.7	21.56	24.69	10.7	15.05	58.09	10.7	50.07	6.08
11.6	61.30	34.75	11.6	53.27	33.40	11.7	22.03	24.84	11.7	15.24	58.23	11.7	50.40	6.25
12.6	61.44	35.01	12.6	53.37	33.62	12.6	22.47	25.00	12.7	15.41	58.37	12.7	50.74	6.43
13.6	61.58	35.31	13.6	53.48	33.86	13.6	22.88	25.15	13.7	15.58	58.50	13.7	51.10	6.64
14.6	61.72	35.63	14.6	53.59	34.13	14.6	23.28	25.29	14.7	15.74	58.60	14.7	51.46	6.86
15.6	61.86	35.98	15.6	53.70	34.41	15.6	23.69	25.42	15.6	15.90	58.69	15.7	51.80	7.13
16.6	61.96	36.34	16.6	53.80	34.73	16.6	24.12	25.51	16.6	16.07	58.77	16.6	52.13	7.40
17.6	62.06	36.68	17.6	53.90	35.06	17.6	24.57	25.61	17.6	16.25	58.84	17.6	52.43	7.68
18.6	62.14	37.02	18.6	53.99	35.38	18.6	25.06	25.74	18.6	16.44	58.93	18.6	52.70	7.96
19.6	62.22	37.36	19.6	54.07	35.69	19.6	25.56	25.88	19.6	16.65	59.04	19.6	52.94	8.23
20.6	62.27	37.68	20.6	54.14	35.98	20.6	26.06	26.04	20.6	16.85	59.17	20.6	53.18	8.50
21.6	62.35	37.98	21.6	54.21	36.26	21.6	26.55	26.22	21.6	17.06	59.33	21.6	53.42	8.75
22.6	62.42	38.27	22.6	54.30	36.51	22.6	27.01	26.44	22.6	17.25	59.51	22.6	53.66	8.97
23.6	62.50	38.55	23.6	54.37	36.77	23.6	27.44	26.66	23.6	17.42	59.69	23.6	53.92	9.19
24.6	62.59	38.85	24.6	54.45	37.03	24.6	27.83	26.89	24.6	17.58	59.89	24.6	54.18	9.42
25.6	62.67	39.16	25.6	54.54	37.31	25.6	28.20	27.11	25.6	17.72	60.08	25.6	54.44	9.66
26.6	62.75	39.49	26.6	54.63	37.62	26.6	28.55	27.32	26.6	17.86	60.27	26.6	54.74	9.93
27.6	62.84	39.85	27.6	54.71	37.93	27.6	28.89	27.52	27.6	18.00	60.45	27.6	55.03	10.20
28.6	62.90	40.21	28.6	54.79	38.26	28.6	29.22	27.71	28.6	18.14	60.62	28.6	55.31	10.51
29.6	62.96	40.58	29.6	54.86	38.61	29.6	29.58	27.89	29.6	18.28	60.79	29.6	55.57	10.82
30.5	63.02	40.95	30.6	54.94	38.97	30.6	29.93	28.07	30.6	18.42	60.93	30.6	55.82	11.13
31.5	63.07	41.33	31.6	54.99	39.34	31.6	30.30	28.26	31.6	18.58	61.10	31.6	56.05	11.46
11.09 -11.05			6.20 -6.12			20.28 +20.26			7.73 +7.66			18.50 -18.48		
5 ^h 46 ^m 3 ^s .075			6 ^h 46 ^m 53 ^s .600			7 ^h 2 ^m 33 ^s .206			7 ^h 13 ^m 55 ^s .106			7 ^h 16 ^m 0 ^s .004		
-84° 49' 45".59			-80° 43' 42".15			+87° 10' 49".32			+82° 34' 23".73			-86° 54' 13".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m 8 17	° ' " +88 52	Nov.	h m 9 8	° ' " -85 20	Nov.	h m 9 25	° ' " +81 40	Nov.	h m 9 36	° ' " -80 34	Nov.	h m 10 21	° ' " +82 57
	s "	"		s "	"		s "	"		s "	"		s "	"
0.7	58.65	15.28	0.8	39.98	10.49	0.8	38.05	48.68	0.8	17.66	23.03	0.8	15.54	57.50
1.7	59.78	15.23	1.8	40.27	10.48	1.8	38.20	48.53	1.8	17.81	22.98	1.8	15.69	57.28
2.7	60.94	15.18	2.8	40.58	10.48	2.8	38.34	48.38	2.8	17.96	22.96	2.8	15.85	57.06
3.7	62.12	15.12	3.8	40.87	10.53	3.8	38.51	48.21	3.8	18.11	22.95	3.8	16.00	56.84
4.7	63.36	15.06	4.8	41.17	10.57	4.8	38.67	48.03	4.8	18.26	22.96	4.8	16.17	56.60
5.7	64.64	15.01	5.8	41.45	10.61	5.8	38.84	47.86	5.8	18.41	22.99	5.8	16.33	56.36
6.7	65.94	14.98	6.8	41.72	10.66	6.8	39.01	47.71	6.8	18.55	23.02	6.8	16.52	56.12
7.7	67.30	14.97	7.8	41.97	10.71	7.8	39.19	47.56	7.8	18.69	23.05	7.8	16.71	55.89
8.7	68.67	14.96	8.7	42.23	10.76	8.8	39.38	47.43	8.8	18.82	23.07	8.8	16.91	55.66
9.7	70.04	14.99	9.7	42.48	10.81	9.8	39.58	47.33	9.8	18.95	23.08	9.8	17.12	55.47
10.7	71.37	15.03	10.7	42.74	10.85	10.8	39.77	47.23	10.8	19.08	23.09	10.8	17.32	55.29
11.7	72.64	15.08	11.7	42.99	10.86	11.8	39.95	47.16	11.8	19.21	23.09	11.8	17.52	55.15
12.7	73.85	15.13	12.7	43.26	10.91	12.8	40.11	47.10	12.8	19.34	23.10	12.8	17.71	55.00
13.7	74.99	15.17	13.7	43.53	10.96	13.7	40.26	47.05	13.8	19.49	23.12	13.8	17.89	54.86
14.7	76.10	15.21	14.7	43.82	11.01	14.7	40.41	46.96	14.8	19.64	23.15	14.8	18.06	54.71
15.7	77.20	15.22	15.7	44.12	11.11	15.7	40.57	46.87	15.7	19.79	23.22	15.8	18.21	54.55
16.7	78.33	15.24	16.7	44.42	11.24	16.7	40.72	46.76	16.7	19.96	23.31	16.8	18.38	54.38
17.7	79.52	15.24	17.7	44.71	11.38	17.7	40.89	46.63	17.7	20.11	23.42	17.8	18.55	54.19
18.7	80.80	15.24	18.7	44.99	11.55	18.7	41.08	46.52	18.7	20.26	23.55	18.8	18.74	53.99
19.7	82.11	15.28	19.7	45.24	11.70	19.7	41.26	46.41	19.7	20.40	23.68	19.8	18.94	53.79
20.7	83.46	15.32	20.7	45.48	11.85	20.7	41.45	46.32	20.7	20.53	23.80	20.8	19.16	53.61
21.7	84.80	15.40	21.7	45.72	11.98	21.7	41.65	46.27	21.7	20.66	23.91	21.8	19.38	53.47
22.7	86.11	15.50	22.7	45.95	12.09	22.7	41.84	46.23	22.7	20.79	24.02	22.8	19.60	53.35
23.7	87.34	15.63	23.7	46.19	12.20	23.7	42.03	46.23	23.7	20.91	24.10	23.8	19.80	53.25
24.7	88.53	15.76	24.7	46.43	12.30	24.7	42.22	46.22	24.7	21.04	24.18	24.8	20.01	53.16
25.7	89.65	15.87	25.7	46.70	12.42	25.7	42.38	46.23	25.7	21.18	24.26	25.8	20.20	53.09
26.7	90.70	15.98	26.7	46.97	12.55	26.7	42.53	46.24	26.7	21.32	24.36	26.8	20.39	53.01
27.7	91.72	16.08	27.7	47.24	12.69	27.7	42.68	46.25	27.7	21.46	24.48	27.7	20.56	52.94
28.7	92.73	16.19	28.7	47.51	12.86	28.7	42.83	46.24	28.7	21.60	24.62	28.7	20.74	52.87
29.7	93.75	16.29	29.7	47.79	13.04	29.7	42.99	46.23	29.7	21.76	24.78	29.7	20.92	52.79
30.7	94.78	16.38	30.7	48.06	13.25	30.7	43.14	46.22	30.7	21.91	24.95	30.7	21.09	52.71
31.6	95.84	16.48	31.7	48.32	13.47	31.7	43.31	46.20	31.7	22.05	25.13	31.7	21.27	52.62
50.74 +50.73			12.30 -12.26			6.91 +6.84			6.11 -6.02			8.16 +8.10		
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
+88° 52' 49''.08			-85° 20' 12''.12			+81° 41' 25''.82			-80° 34' 23''.04			+82° 58' 35''.87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1673. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m 10 59	° ' " -84 9	Nov.	h m 12 13	° ' " +88 8	Nov.	h m 12 46	° ' " -84 40	Nov.	h m 12 48	° ' " +83 50	Nov.	h m 13 27	° ' " -85 22
	s "	"		s "	"		s "	"		s "	"		s "	"
0.8	48.68	15.89	0.9	52.98	42.01	0.9	9.22	53.78	0.9	19.47	60.47	0.9	20.61	14.41
1.8	48.91	15.72	1.9	53.26	41.70	1.9	9.37	53.49	1.9	19.53	60.13	1.9	20.74	14.08
2.8	49.12	15.57	2.9	53.53	41.38	2.9	9.54	53.21	2.9	19.59	59.78	2.9	20.88	13.79
3.8	49.34	15.44	3.9	53.81	41.04	3.9	9.70	52.95	3.9	19.65	59.42	3.9	21.02	13.50
4.8	49.56	15.32	4.9	54.12	40.70	4.9	9.87	52.71	4.9	19.71	59.06	4.9	21.19	13.21
5.8	49.78	15.22	5.9	54.44	40.34	5.9	10.06	52.48	5.9	19.78	58.69	5.9	21.35	12.93
6.8	49.97	15.13	6.9	54.81	39.99	6.9	10.23	52.26	6.9	19.87	58.31	6.9	21.50	12.68
7.8	50.18	15.04	7.9	55.22	39.64	7.9	10.39	52.06	7.9	19.96	57.93	7.9	21.65	12.44
8.8	50.38	14.95	8.9	55.67	39.30	8.9	10.54	51.85	8.9	20.09	57.54	8.9	21.80	12.20
9.8	50.56	14.85	9.9	56.14	38.96	9.9	10.69	51.63	9.9	20.21	57.16	9.9	21.93	11.96
10.8	50.75	14.74	10.9	56.65	38.65	10.9	10.83	51.41	10.9	20.33	56.80	10.9	22.06	11.70
11.8	50.93	14.62	11.9	57.16	38.37	11.9	10.98	51.19	11.9	20.45	56.47	11.9	22.19	11.44
12.8	51.14	14.50	12.9	57.63	38.09	12.9	11.14	50.95	12.9	20.58	56.15	12.9	22.33	11.18
13.8	51.36	14.40	13.9	58.07	37.81	13.9	11.31	50.71	13.9	20.68	55.86	13.9	22.49	10.90
14.8	51.58	14.30	14.9	58.49	37.55	14.9	11.50	50.47	14.9	20.78	55.57	14.9	22.67	10.61
15.8	51.82	14.23	15.9	58.87	37.29	15.9	11.72	50.25	15.9	20.88	55.26	15.9	22.86	10.33
16.8	52.07	14.18	16.9	59.24	36.99	16.9	11.94	50.05	16.9	20.97	54.95	16.9	23.09	10.08
17.8	52.32	14.14	17.9	59.63	36.68	17.9	12.17	49.86	17.9	21.07	54.62	17.9	23.32	9.85
18.8	52.56	14.14	18.8	60.04	36.37	18.9	12.40	49.72	18.9	21.17	54.26	18.9	23.55	9.66
19.8	52.79	14.14	19.8	60.52	36.05	19.9	12.62	49.58	19.9	21.30	53.90	19.9	23.78	9.47
20.8	53.01	14.15	20.8	61.05	35.74	20.9	12.84	49.45	20.9	21.44	53.54	20.9	24.00	9.28
21.8	53.21	14.15	21.8	61.62	35.45	21.9	13.04	49.32	21.9	21.59	53.20	21.9	24.20	9.10
22.8	53.41	14.15	22.8	62.21	35.16	22.9	13.23	49.18	22.9	21.76	52.88	22.9	24.38	8.90
23.8	53.60	14.11	23.8	62.82	34.91	23.9	13.41	49.01	23.9	21.93	52.59	23.9	24.56	8.70
24.8	53.82	14.07	24.8	63.42	34.69	24.9	13.60	48.84	24.9	22.08	52.31	24.9	24.74	8.49
25.8	54.04	14.03	25.8	63.98	34.48	25.9	13.80	48.67	25.9	22.23	52.04	25.9	24.94	8.27
26.8	54.27	14.01	26.8	64.53	34.28	26.8	14.01	48.49	26.9	22.38	51.78	26.9	25.15	8.05
27.8	54.49	14.00	27.8	65.05	34.08	27.8	14.23	48.31	27.8	22.52	51.54	27.9	25.37	7.83
28.8	54.74	14.00	28.8	65.57	33.89	28.8	14.46	48.14	28.8	22.66	51.30	28.9	25.62	7.61
29.8	54.99	14.00	29.8	66.07	33.67	29.8	14.70	48.00	29.8	22.80	51.06	29.9	25.86	7.40
30.8	55.24	14.04	30.8	66.57	33.46	30.8	14.96	47.86	30.8	22.93	50.79	30.9	26.13	7.21
31.8	55.49	14.09	31.8	67.08	33.24	31.8	15.23	47.73	31.8	23.07	50.52	31.9	26.41	7.03
9.82 -9.77			30.87 +30.86			10.79 -10.74			9.33 +9.28			12.39 -12.35		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
-84° 9' 9".97			+88° 9' 16".14			-84° 40' 41".95			+83° 51' 30".88			-85° 22' 0".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Nov.	14 13	-83 17	Nov.	15 2	+87 32	Nov.	15 24	-84 11	Nov.	16 54	+82 10	Nov.	17 16	-80 47
	s	"		s	"		s	"		s	"		s	"
0.9	37.63	52.37	1.0	27.38	44.11	1.0	13.41	58.25	1.1	3.81	33.94	1.1	12.55	23.50
1.9	37.68	52.04	2.0	27.21	43.79	2.0	13.40	57.89	2.1	3.68	33.69	2.1	12.47	23.21
2.9	37.74	51.71	3.0	27.03	43.48	3.0	13.40	57.55	3.1	3.56	33.45	3.1	12.41	22.92
3.9	37.81	51.39	4.0	26.85	43.15	4.0	13.40	57.21	4.1	3.45	33.19	4.1	12.35	22.63
4.9	37.89	51.08	5.0	26.67	42.78	5.0	13.43	56.89	5.1	3.33	32.93	5.1	12.29	22.35
5.9	37.97	50.79	6.0	26.50	42.42	6.0	13.45	56.58	6.1	3.20	32.65	6.1	12.25	22.07
6.9	38.06	50.51	6.9	26.35	42.05	7.0	13.48	56.29	7.1	3.08	32.34	7.1	12.21	21.79
7.9	38.14	50.24	7.9	26.22	41.66	8.0	13.51	56.00	8.1	2.98	32.02	8.1	12.17	21.55
8.9	38.20	49.98	8.9	26.13	41.25	9.0	13.54	55.73	9.1	2.87	31.70	9.1	12.13	21.30
9.9	38.26	49.72	9.9	26.07	40.83	10.0	13.55	55.46	10.1	2.77	31.37	10.1	12.09	21.06
10.9	38.32	49.46	10.9	26.03	40.45	11.0	13.56	55.18	11.1	2.68	31.03	11.1	12.05	20.82
11.9	38.38	49.19	11.9	26.02	40.08	12.0	13.56	54.87	12.1	2.59	30.69	12.1	11.99	20.55
12.9	38.44	48.87	12.9	26.01	39.72	12.9	13.57	54.55	13.1	2.51	30.37	13.1	11.93	20.27
13.9	38.52	48.57	13.9	25.98	39.39	13.9	13.59	54.21	14.1	2.42	30.08	14.1	11.87	19.97
14.9	38.61	48.26	14.9	25.94	39.05	14.9	13.62	53.87	15.1	2.34	29.80	15.1	11.82	19.65
15.9	38.71	47.95	15.9	25.87	38.72	15.9	13.67	53.51	16.1	2.26	29.52	16.1	11.78	19.33
16.9	38.84	47.66	16.9	25.79	38.39	16.9	13.75	53.16	17.0	2.16	29.24	17.1	11.77	19.00
17.9	38.97	47.38	17.9	25.69	38.03	17.9	13.84	52.82	18.0	2.07	28.95	18.1	11.76	18.67
18.9	39.11	47.13	18.9	25.60	37.66	18.9	13.94	52.51	19.0	1.97	28.64	19.1	11.75	18.35
19.9	39.25	46.90	19.9	25.56	37.28	19.9	14.03	52.23	20.0	1.89	28.32	20.1	11.75	18.06
20.9	39.38	46.68	20.9	25.54	36.87	20.9	14.12	51.96	21.0	1.80	27.95	21.1	11.75	17.78
21.9	39.50	46.47	21.9	25.56	36.46	21.9	14.21	51.69	22.0	1.72	27.58	22.0	11.75	17.51
22.9	39.60	46.24	22.9	25.60	36.06	22.9	14.27	51.43	23.0	1.66	27.20	23.0	11.75	17.25
23.9	39.70	46.01	23.9	25.69	35.68	23.9	14.33	51.16	24.0	1.61	26.83	24.0	11.72	16.98
24.9	39.80	45.78	24.9	25.80	35.32	24.9	14.39	50.88	25.0	1.56	26.49	25.0	11.69	16.70
25.9	39.91	45.50	25.9	25.91	34.96	25.9	14.46	50.58	26.0	1.52	26.15	26.0	11.66	16.39
26.9	40.03	45.24	26.9	26.01	34.63	26.9	14.54	50.27	27.0	1.47	25.81	27.0	11.64	16.07
27.9	40.16	44.96	27.9	26.10	34.31	27.9	14.62	49.95	28.0	1.42	25.48	28.0	11.63	15.74
28.9	40.29	44.69	28.9	26.17	34.00	28.9	14.70	49.63	29.0	1.38	25.17	29.0	11.62	15.41
29.9	40.44	44.44	29.9	26.25	33.69	29.9	14.82	49.30	30.0	1.33	24.86	30.0	11.62	15.07
30.9	40.60	44.19	30.9	26.32	33.37	30.9	14.94	48.99	31.0	1.29	24.55	31.0	11.63	14.73
31.9	40.76	43.96	31.9	26.38	33.04	31.9	15.08	48.70	32.0	1.23	24.23	32.0	11.64	14.38
8.57 -8.51			23.34 +23.32			9.89 -9.84			7.34 +7.28			6.25 -6.17		
14 ^h 13 ^m 37 ^s .066			15 ^h 3 ^m 21 ^s .809			15 ^h 24 ^m 9 ^s .966			16 ^h 54 ^m 19 ^s .238			17 ^h 16 ^m 6 ^s .064		
-83° 17' 37".78			+87° 32' 56".60			-84° 11' 42".92			+82° 10' 27".09			-80° 47' 10".43		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Nov.	17 57	+86 37	Nov.	18 7	−87 39	Nov.	18 58	+89 1	Nov.	19 29	−89 13	Nov.	20 48	+82 14
	s	"		s	"		s	"		s	"		s	"
1.1	65.06	8.08	1.1	8.03	63.44	1.2	93.80	33.17	1.2	89.34	28.67	1.3	32.44	20.37
2.1	64.72	7.92	2.1	7.61	63.18	2.2	92.51	33.10	2.2	87.72	28.52	2.3	32.27	20.45
3.1	64.38	7.76	3.1	7.22	62.92	3.2	91.18	33.03	3.2	86.15	28.37	3.2	32.13	20.54
4.1	64.02	7.60	4.1	6.85	62.65	4.2	89.82	32.96	4.2	84.64	28.20	4.2	31.96	20.63
5.1	63.66	7.43	5.1	6.52	62.39	5.2	88.42	32.88	5.2	83.23	28.02	5.2	31.79	20.72
6.1	63.29	7.24	6.1	6.22	62.13	6.2	86.97	32.80	6.2	81.90	27.84	6.2	31.63	20.80
7.1	62.92	7.02	7.1	5.93	61.89	7.2	85.49	32.70	7.2	80.62	27.67	7.2	31.45	20.86
8.1	62.55	6.79	8.1	5.65	61.65	8.2	84.01	32.56	8.2	79.40	27.51	8.2	31.26	20.91
9.1	62.20	6.53	9.1	5.38	61.43	9.2	82.55	32.40	9.2	78.20	27.36	9.2	31.08	20.94
10.1	61.86	6.27	10.1	5.09	61.21	10.2	81.13	32.23	10.2	76.97	27.22	10.2	30.89	20.95
11.1	61.54	6.01	11.1	4.77	60.98	11.2	79.79	32.06	11.2	75.68	27.08	11.2	30.71	20.95
12.1	61.25	5.75	12.1	4.44	60.75	12.1	78.51	31.88	12.2	74.30	26.93	12.2	30.53	20.92
13.1	60.97	5.51	13.1	4.07	60.50	13.1	77.31	31.71	13.2	72.87	26.76	13.2	30.36	20.89
14.1	60.70	5.27	14.1	3.74	60.23	14.1	76.16	31.57	14.2	71.41	26.59	14.2	30.20	20.88
15.1	60.42	5.08	15.1	3.41	59.91	15.1	75.01	31.42	15.2	69.96	26.38	15.2	30.05	20.88
16.1	60.13	4.87	16.1	3.13	59.60	16.1	73.83	31.29	16.2	68.58	26.15	16.2	29.90	20.88
17.1	59.84	4.67	17.1	2.88	59.27	17.1	72.59	31.18	17.2	67.31	25.89	17.2	29.73	20.92
18.1	59.52	4.46	18.1	2.68	58.95	18.1	71.29	31.06	18.2	66.16	25.62	18.2	29.57	20.95
19.1	59.20	4.23	19.1	2.53	58.63	19.1	69.93	30.93	19.2	65.12	25.35	19.2	29.41	20.97
20.1	58.87	3.96	20.1	2.39	58.34	20.1	68.56	30.76	20.1	64.17	25.11	20.2	29.23	20.97
21.1	58.56	3.69	21.1	2.25	58.05	21.1	67.20	30.57	21.1	63.24	24.86	21.2	29.05	20.94
22.1	58.27	3.39	22.1	2.08	57.79	22.1	65.88	30.35	22.1	62.31	24.65	22.2	28.86	20.89
23.1	58.00	3.08	23.1	1.91	57.54	23.1	64.65	30.11	23.1	61.31	24.45	23.2	28.69	20.81
24.1	57.76	2.76	24.1	1.71	57.28	24.1	63.51	29.87	24.1	60.24	24.23	24.2	28.51	20.73
25.1	57.53	2.45	25.1	1.48	56.99	25.1	62.44	29.64	25.1	59.10	24.01	25.2	28.34	20.64
26.1	57.32	2.16	26.1	1.25	56.69	26.1	61.44	29.41	26.1	57.93	23.79	26.2	28.19	20.54
27.1	57.12	1.87	27.1	1.02	56.37	27.1	60.46	29.18	27.1	56.72	23.53	27.2	28.04	20.44
28.1	56.93	1.60	28.1	0.82	56.04	28.1	59.52	28.97	28.1	55.55	23.27	28.2	27.89	20.35
29.1	56.72	1.34	29.1	0.63	55.68	29.1	58.58	28.77	29.1	54.42	23.00	29.2	27.75	20.27
30.1	56.52	1.08	30.1	0.47	55.32	30.1	57.61	28.58	30.1	53.36	22.71	30.2	27.60	20.19
31.1	56.32	0.81	31.1	0.36	54.97	31.1	56.61	28.39	31.1	52.37	22.42	31.2	27.45	20.12
32.1	56.09	0.54	32.1	0.26	54.62	32.1	55.60	28.19	32.1	51.47	22.10	32.2	27.30	20.05
16.95 +16.92			24.56 −24.54			58.79 +58.78			73.84 −73.83			7.41 +7.34		
17 ^h 58 ^m 41 ^s .809			18 ^h 6 ^m 47 ^s .620			19 ^h 1 ^m 27 ^s .463			19 ^h 29 ^m 16 ^s .746			20 ^h 48 ^m 36 ^s .323		
+86° 36' 51''.12			−87° 39' 51''.38			+89° 1' 7''.53			−89° 13' 21''.02			+82° 13' 43''.34		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	De- clination.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	'
Nov.	21 38	-83 5	Nov.	22 16	-86 23	Nov.	22 37	-81 48	Nov.	23 27	+86 51	Nov.	23 47	-82
	s	"		s	"		s	"		s	"		s	'
1.3	41.39	48.85	1.3	40.88	5.01	1.3	55.88	37.50	1.4	61.57	56.76	1.4	30.13	18
2.3	41.19	48.91	2.3	40.52	5.12	2.3	55.73	37.66	2.4	61.35	57.03	2.4	29.99	18
3.3	41.00	48.96	3.3	40.15	5.22	3.3	55.58	37.81	3.4	61.12	57.31	3.4	29.85	18
4.3	40.82	48.98	4.3	39.80	5.30	4.3	55.43	37.92	4.4	60.87	57.60	4.4	29.72	18
5.3	40.64	48.99	5.3	39.46	5.36	5.3	55.29	38.02	5.4	60.61	57.90	5.4	29.58	19
6.3	40.47	49.00	6.3	39.14	5.40	6.3	55.15	38.11	6.4	60.35	58.20	6.4	29.45	19
7.3	40.31	49.00	7.3	38.83	5.46	7.3	55.02	38.19	7.3	60.07	58.51	7.4	29.33	19
8.3	40.16	49.01	8.3	38.53	5.52	8.3	54.90	38.28	8.3	59.76	58.81	8.4	29.22	19
9.3	40.01	49.04	9.3	38.24	5.58	9.3	54.77	38.38	9.3	59.43	59.09	9.4	29.11	19
10.3	39.86	49.07	10.3	37.95	5.64	10.3	54.65	38.49	10.3	59.08	59.34	10.4	28.99	19
11.3	39.70	49.09	11.3	37.64	5.71	11.3	54.53	38.60	11.3	58.73	59.58	11.4	28.87	20
12.3	39.53	49.11	12.3	37.32	5.79	12.3	54.40	38.71	12.3	58.38	59.81	12.3	28.74	20
13.3	39.35	49.13	13.3	36.97	5.87	13.3	54.25	38.82	13.3	58.06	60.01	13.3	28.60	20
14.3	39.16	49.14	14.3	36.60	5.93	14.3	54.09	38.93	14.3	57.76	60.21	14.3	28.45	20
15.3	38.96	49.12	15.3	36.22	5.97	15.3	53.92	39.00	15.3	57.47	60.43	15.3	28.29	20
16.2	38.76	49.09	16.3	35.84	5.98	16.3	53.76	39.05	16.3	57.19	60.66	16.3	28.13	20
17.2	38.57	49.02	17.3	35.46	5.98	17.3	53.60	39.08	17.3	56.92	60.93	17.3	27.96	20
18.2	38.40	48.93	18.3	35.11	5.95	18.3	53.45	39.09	18.3	56.64	61.19	18.3	27.80	20
19.2	38.23	48.85	19.3	34.77	5.90	19.3	53.31	39.08	19.3	56.33	61.45	19.3	27.65	20
20.2	38.08	48.76	20.3	34.46	5.84	20.3	53.17	39.08	20.3	55.98	61.70	20.3	27.51	20
21.2	37.94	48.68	21.3	34.17	5.80	21.3	53.05	39.07	21.3	55.61	61.93	21.3	27.38	20
22.2	37.80	48.61	22.3	33.87	5.78	22.3	52.93	39.08	22.3	55.22	62.14	22.3	27.25	20
23.2	37.65	48.55	23.3	33.56	5.77	23.3	52.80	39.10	23.3	54.82	62.33	23.3	27.12	20
24.2	37.50	48.50	24.3	33.25	5.77	24.3	52.67	39.13	24.3	54.43	62.51	24.3	26.99	20
25.2	37.33	48.45	25.2	32.92	5.76	25.3	52.52	39.16	25.3	54.05	62.66	25.3	26.84	20
26.2	37.15	48.41	26.2	32.56	5.75	26.3	52.37	39.18	26.3	53.67	62.80	26.3	26.68	20
27.2	36.96	48.34	27.2	32.20	5.73	27.3	52.21	39.20	27.3	53.33	62.93	27.3	26.51	20
28.2	36.78	48.26	28.2	31.83	5.71	28.3	52.04	39.21	28.3	52.99	63.07	28.3	26.34	20
29.2	36.59	48.15	29.2	31.45	5.64	29.3	51.88	39.21	29.3	52.65	63.21	29.3	26.16	20
30.2	36.41	48.03	30.2	31.07	5.56	30.3	51.71	39.18	30.3	52.33	63.36	30.3	25.99	20
31.2	36.23	47.90	31.2	30.71	5.47	31.2	51.55	39.15	31.3	52.00	63.51	31.3	25.81	20
32.2	36.07	47.75	32.2	30.36	5.37	32.2	51.40	39.08	32.3	51.66	63.67	32.3	25.64	20
8.32 -8.26			15.86 -15.83			7.02 -6.95			18.30 +18.27			7.63 -7.50		
21 ^h 38 ^m 29 ^s .050			22 ^h 16 ^m 20 ^s .949			22 ^h 37 ^m 45 ^s .323			23 ^h 27 ^m 43 ^s .851			23 ^h 47 ^m 20 ^s .000		
-83° 5' 50''.66			-86° 23' 9''.03			-81° 48' 43''.57			+86° 51' 18''.76			-82° 28' 28''.00		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			<i>α</i> Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m ° ' "			h m ° ' "			h m ° ' "			h m ° ' "			h m ° ' "	
Dec.	0 57	+85 49	Dec.	1 31	+88 52	Dec.	1 41	-85 10	Dec.	4 10	+85 20	Dec.	5 36	+85 9
	s	"		s	"		s	"		s	"		s	"
0.3	39.48	44.52	0.4	74.59	38.29	0.4	63.40	56.32	0.5	59.35	31.01	0.5	10.25	27.36
1.3	39.31	44.77	1.4	74.06	38.58	1.4	63.17	56.54	1.5	59.41	31.32	1.5	10.40	27.63
2.3	39.14	45.03	2.4	73.52	38.87	2.4	62.94	56.74	2.5	59.47	31.64	2.5	10.55	27.89
3.3	38.97	45.29	3.4	72.95	39.17	3.4	62.71	56.93	3.5	59.54	31.96	3.5	10.70	28.17
4.3	38.78	45.56	4.4	72.33	39.48	4.4	62.49	57.10	4.5	59.60	32.32	4.5	10.86	28.48
5.3	38.56	45.82	5.4	71.66	39.78	5.4	62.28	57.25	5.5	59.65	32.68	5.5	11.01	28.79
6.3	38.33	46.07	6.4	70.92	40.09	6.4	62.08	57.40	6.5	59.68	33.04	6.5	11.15	29.13
7.3	38.08	46.32	7.4	70.10	40.38	7.4	61.88	57.55	7.5	59.69	33.40	7.5	11.27	29.48
8.3	37.83	46.55	8.3	69.24	40.66	8.4	61.69	57.72	8.5	59.69	33.77	8.5	11.38	29.82
9.3	37.57	46.75	9.3	68.36	40.90	9.4	61.49	57.89	9.5	59.66	34.12	9.5	11.46	30.16
10.3	37.30	46.94	10.3	67.50	41.13	10.4	61.27	58.08	10.5	59.63	34.46	10.5	11.52	30.49
11.3	37.06	47.10	11.3	66.68	41.34	11.4	61.04	58.28	11.5	59.59	34.75	11.5	11.58	30.79
12.3	36.83	47.27	12.3	65.92	41.54	12.3	60.79	58.46	12.4	59.56	35.04	12.5	11.65	31.07
13.3	36.63	47.45	13.3	65.22	41.76	13.3	60.53	58.64	13.4	59.55	35.32	13.5	11.73	31.34
14.3	36.43	47.64	14.3	64.57	41.99	14.3	60.26	58.79	14.4	59.56	35.61	14.5	11.81	31.60
15.3	36.23	47.82	15.3	63.90	42.22	15.3	59.99	58.94	15.4	59.58	35.92	15.5	11.92	31.87
16.3	36.01	48.01	16.3	63.19	42.47	16.3	59.71	59.05	16.4	59.59	36.24	16.5	12.03	32.17
17.3	35.78	48.23	17.3	62.42	42.72	17.3	59.45	59.14	17.4	59.60	36.58	17.5	12.14	32.49
18.3	35.54	48.44	18.3	61.57	42.98	18.3	59.20	59.21	18.4	59.59	36.92	18.5	12.24	32.83
19.3	35.27	48.64	19.3	60.64	43.23	19.3	58.97	59.28	19.4	59.56	37.28	19.5	12.31	33.19
20.3	34.98	48.80	20.3	59.64	43.47	20.3	58.74	59.36	20.4	59.52	37.64	20.5	12.37	33.55
21.3	34.69	48.95	21.3	58.61	43.67	21.3	58.51	59.44	21.4	59.43	37.98	21.5	12.41	33.89
22.3	34.39	49.08	22.3	57.57	43.86	22.3	58.29	59.55	22.4	59.34	38.29	22.5	12.42	34.23
23.3	34.10	49.19	23.3	56.56	44.01	23.3	58.05	59.67	23.4	59.24	38.58	23.5	12.43	34.55
24.3	33.81	49.29	24.3	55.57	44.16	24.3	57.79	59.79	24.4	59.14	38.87	24.5	12.42	34.86
25.3	33.56	49.37	25.3	54.63	44.29	25.3	57.52	59.90	25.4	59.04	39.14	25.5	12.42	35.15
26.3	33.31	49.45	26.3	53.72	44.43	26.3	57.24	60.00	26.4	58.95	39.41	26.5	12.41	35.44
27.3	33.06	49.53	27.3	52.82	44.56	27.3	56.95	60.10	27.4	58.86	39.68	27.5	12.42	35.73
28.3	32.81	49.62	28.3	51.95	44.70	28.3	56.67	60.17	28.4	58.78	39.95	28.5	12.43	36.02
29.3	32.57	49.70	29.3	51.07	44.84	29.3	56.38	60.23	29.4	58.71	40.22	29.5	12.44	36.31
30.3	32.32	49.80	30.3	50.18	44.98	30.3	56.09	60.27	30.4	58.65	40.49	30.5	12.46	36.61
31.3	32.06	49.91	31.3	49.26	45.14	31.3	55.81	60.28	31.4	58.57	40.77	31.5	12.48	36.92
13.75 +13.72			51.09 +51.08			11.91 -11.87			12.32 +12.28			11.85 +11.81		
0 ^h 57 ^m 16 ^s .959			1 ^h 30 ^m 42 ^s .307			1 ^h 41 ^m 58 ^s .587			4 ^h 10 ^m 20 ^s .187			5 ^h 35 ^m 31 ^s .554		
+85° 49' 4".72			+88° 52' 2".06			-85° 11' 3".34			+85° 20' 19".62			+85° 9' 32".39		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			ζ Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m 5 46	° ' -84 49	Dec.	h m 6 46	° ' -80 43	Dec.	h m 7 3	° ' +87 10	Dec.	h m 7 14	° ' +82 34	Dec.	h m 7 15	° ' -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.5	3.02	40.95	0.6	54.94	38.97	0.6	29.93	28.07	0.6	18.42	0.93	0.6	55.82	11.13
1.5	3.07	41.33	1.6	54.99	39.34	1.6	30.30	28.26	1.6	18.58	1.10	1.6	56.05	11.46
2.5	3.10	41.70	2.6	55.05	39.70	2.6	30.67	28.45	2.6	18.73	1.26	2.6	56.25	11.80
3.5	3.12	42.07	3.6	55.11	40.05	3.6	31.06	28.66	3.6	18.90	1.44	3.6	56.43	12.13
4.5	3.13	42.41	4.6	55.16	40.39	4.6	31.46	28.88	4.6	19.07	1.63	4.6	56.61	12.45
5.5	3.14	42.74	5.6	55.21	40.72	5.6	31.86	29.11	5.6	19.23	1.84	5.6	56.75	12.76
6.5	3.14	43.06	6.6	55.25	41.04	6.6	32.24	29.38	6.6	19.38	2.07	6.6	56.89	13.05
7.5	3.15	43.37	7.6	55.30	41.36	7.6	32.61	29.65	7.6	19.53	2.31	7.6	57.05	13.34
8.5	3.16	43.68	8.6	55.34	41.67	8.6	32.94	29.93	8.6	19.68	2.58	8.6	57.21	13.63
9.5	3.18	44.01	9.6	55.40	41.98	9.6	33.23	30.21	9.6	19.81	2.84	9.6	57.38	13.92
10.5	3.20	44.34	10.6	55.44	42.31	10.6	33.51	30.48	10.6	19.91	3.09	10.6	57.57	14.22
11.5	3.22	44.70	11.6	55.49	42.66	11.6	33.75	30.73	11.6	20.02	3.33	11.6	57.76	14.54
12.5	3.23	45.08	12.6	55.54	43.03	12.6	34.01	30.96	12.6	20.13	3.55	12.6	57.94	14.80
13.5	3.22	45.47	13.6	55.58	43.43	13.6	34.27	31.19	13.6	20.24	3.77	13.6	58.09	15.26
14.5	3.19	45.86	14.6	55.61	43.83	14.6	34.55	31.41	14.6	20.36	3.96	14.6	58.23	15.64
15.5	3.15	46.25	15.5	55.64	44.24	15.6	34.86	31.64	15.6	20.49	4.15	15.6	58.33	16.03
16.5	3.10	46.62	16.5	55.65	44.62	16.6	35.18	31.88	16.6	20.62	4.36	16.6	58.41	16.41
17.5	3.04	46.98	17.5	55.66	45.00	17.6	35.51	32.14	17.6	20.77	4.58	17.6	58.46	16.77
18.5	2.98	47.31	18.5	55.67	45.34	18.6	35.83	32.41	18.6	20.91	4.85	18.6	58.50	17.11
19.5	2.92	47.64	19.5	55.68	45.68	19.5	36.13	32.71	19.6	21.04	5.12	19.6	58.55	17.44
20.5	2.87	47.95	20.5	55.69	46.01	20.5	36.39	33.03	20.6	21.16	5.42	20.6	58.60	17.75
21.5	2.82	48.26	21.5	55.70	46.35	21.5	36.62	33.35	21.6	21.26	5.71	21.6	58.68	18.05
22.5	2.79	48.58	22.5	55.72	46.68	22.5	36.81	33.66	22.5	21.35	6.01	22.6	58.76	18.36
23.5	2.75	48.92	23.5	55.73	47.03	23.5	36.99	33.98	23.5	21.43	6.30	23.5	58.85	18.69
24.5	2.70	49.27	24.5	55.75	47.39	24.5	37.14	34.28	24.5	21.49	6.58	24.5	58.93	19.05
25.5	2.65	49.63	25.5	55.76	47.75	25.5	37.28	34.56	25.5	21.55	6.84	25.5	59.01	19.41
26.5	2.57	49.99	26.5	55.77	48.14	26.5	37.42	34.83	26.5	21.63	7.09	26.5	59.07	19.79
27.5	2.50	50.36	27.5	55.78	48.55	27.5	37.57	35.11	27.5	21.70	7.33	27.5	59.13	20.17
28.5	2.42	50.73	28.5	55.77	48.95	28.5	37.74	35.38	28.5	21.77	7.58	28.5	59.17	20.56
29.5	2.33	51.10	29.5	55.76	49.35	29.5	37.91	35.65	29.5	21.85	7.84	29.5	59.17	20.95
30.5	2.23	51.46	30.5	55.75	49.74	30.5	38.09	35.93	30.5	21.92	8.11	30.5	59.15	21.33
31.5	2.10	51.80	31.5	55.72	50.12	31.5	38.28	36.22	31.5	22.01	8.37	31.5	59.12	21.71
11.10 -11.05			6.21 -6.13			20.29 +20.27			7.73 +7.67			18.52 -18.49		
5 ^h 46 ^m 3 ^s .075			6 ^h 46 ^m 53 ^s .600			7 ^h 2 ^m 33 ^s .206			7 ^h 13 ^m 55 ^s .106			7 ^h 16 ^m 0 ^s .004		
-84° 49' 45".59			-80° 43' 42".15			+87° 10' 49".32			+82° 34' 23".73			-86° 54' 13".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamseleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Dec.	8 18	+88 52	Dec.	9 8	-85 20	Dec.	9 25	+81 40	Dec.	9 36	-80 34	Dec.	10 21	+82 57
	s	"		s	"		s	"		s	"		s	"
0.7	34.78	16.38	0.7	48.06	13.25	0.7	43.14	46.22	0.7	21.91	24.95	0.7	21.09	52.71
1.6	35.84	16.48	1.7	48.32	13.47	1.7	43.31	46.20	1.7	22.05	25.13	1.7	21.27	52.62
2.6	36.94	16.57	2.7	48.56	13.69	2.7	43.48	46.18	2.7	22.19	25.32	2.7	21.47	52.52
3.6	38.08	16.67	3.7	48.80	13.92	3.7	43.66	46.16	3.7	22.33	25.53	3.7	21.66	52.42
4.6	39.24	16.80	4.7	49.03	14.15	4.7	43.83	46.17	4.7	22.46	25.74	4.7	21.88	52.34
5.6	40.45	16.93	5.7	49.23	14.37	5.7	44.02	46.20	5.7	22.58	25.93	5.7	22.10	52.28
6.6	41.62	17.09	6.7	49.44	14.57	6.7	44.21	46.24	6.7	22.70	26.13	6.7	22.32	52.22
7.6	42.77	17.27	7.7	49.64	14.78	7.7	44.39	46.31	7.7	22.81	26.31	7.7	22.53	52.18
8.6	43.86	17.47	8.7	49.85	14.96	8.7	44.57	46.39	8.7	22.92	26.50	8.7	22.75	52.17
9.6	44.87	17.67	9.7	50.07	15.15	9.7	44.74	46.47	9.7	23.04	26.67	9.7	22.95	52.18
10.6	45.81	17.86	10.7	50.29	15.37	10.7	44.88	46.55	10.7	23.17	26.85	10.7	23.13	52.20
11.6	46.68	18.05	11.7	50.53	15.59	11.7	45.02	46.63	11.7	23.30	27.05	11.7	23.31	52.21
12.6	47.53	18.23	12.7	50.76	15.84	12.7	45.16	46.71	12.7	23.43	27.28	12.7	23.49	52.21
13.6	48.39	18.38	13.7	51.00	16.11	13.7	45.31	46.76	13.7	23.56	27.54	13.7	23.66	52.21
14.6	49.29	18.53	14.6	51.23	16.43	14.7	45.46	46.81	14.7	23.70	27.81	14.7	23.84	52.17
15.6	50.25	18.67	15.6	51.44	16.74	15.7	45.60	46.85	15.7	23.83	28.10	15.7	24.02	52.13
16.6	51.26	18.84	16.6	51.64	17.05	16.7	45.78	46.89	16.7	23.94	28.39	16.7	24.21	52.12
17.6	52.31	19.02	17.6	51.82	17.34	17.7	45.96	46.96	17.7	24.05	28.67	17.7	24.43	52.10
18.6	53.36	19.21	18.6	51.97	17.64	18.7	46.14	47.04	18.7	24.15	28.95	18.7	24.65	52.10
19.6	54.38	19.44	19.6	52.13	17.93	19.6	46.31	47.16	19.7	24.25	29.23	19.7	24.87	52.14
20.6	55.34	19.69	20.6	52.30	18.19	20.6	46.49	47.29	20.7	24.35	29.48	20.7	25.07	52.19
21.6	56.24	19.95	21.6	52.46	18.45	21.6	46.64	47.44	21.6	24.45	29.71	21.7	25.27	52.28
22.6	57.04	20.21	22.6	52.63	18.71	22.6	46.78	47.61	22.6	24.55	29.95	22.7	25.46	52.37
23.6	57.76	20.47	23.6	52.80	18.97	23.6	46.92	47.76	23.6	24.65	30.22	23.7	25.65	52.45
24.6	58.44	20.71	24.6	52.99	19.24	24.6	47.05	47.91	24.6	24.75	30.49	24.7	25.81	52.54
25.6	59.10	20.95	25.6	53.17	19.55	25.6	47.17	48.07	25.6	24.86	30.76	25.7	25.98	52.63
26.6	59.75	21.18	26.6	53.36	19.86	26.6	47.29	48.22	26.6	24.97	31.04	26.7	26.14	52.73
27.6	60.39	21.41	27.6	53.55	20.19	27.6	47.41	48.36	27.6	25.08	31.35	27.7	26.30	52.81
28.6	61.07	21.63	28.6	53.72	20.53	28.6	47.54	48.51	28.6	25.19	31.68	28.7	26.46	52.89
29.6	61.76	21.85	29.6	53.86	20.88	29.6	47.67	48.65	29.6	25.29	32.01	29.7	26.63	52.96
30.6	62.49	22.08	30.6	54.00	21.24	30.6	47.80	48.78	30.6	25.39	32.37	30.7	26.81	53.04
31.6	63.23	22.31	31.6	54.14	21.59	31.6	47.94	48.92	31.6	25.48	32.71	31.7	26.98	53.12
50.79 +50.78			12.30 -12.26			6.91 +6.84			6.11 -6.02			8.16 +8.10		
8 ^h 16 ^m 48 ^s .125			9 ^h 8 ^m 49 ^s .775			9 ^h 25 ^m 30 ^s .501			9 ^h 36 ^m 20 ^s .688			10 ^h 21 ^m 12 ^s .394		
+88° 52' 49''.08			-85° 20' 12''.12			+81° 41' 25''.82			-80° 34' 23''.04			+82° 58' 35''.87		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

7 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			1 Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Dec.	10 59	-84 9	Dec.	12 14	+88 8	Dec.	12 46	-84 40	Dec.	12 48	+83 50	Dec.	13 27	-85 22
	s	"		s	"		s	"		s	"		s	"
0.8	55.24	14.04	0.8	6.57	33.46	0.8	14.96	47.86	0.8	22.93	50.79	0.9	26.13	7.21
1.8	55.49	14.09	1.8	7.08	33.24	1.8	15.23	47.73	1.8	23.07	50.52	1.9	26.41	7.03
2.8	55.74	14.16	2.8	7.61	33.00	2.8	15.48	47.64	2.8	23.22	50.25	2.9	26.69	6.87
3.8	55.98	14.24	3.8	8.17	32.76	3.8	15.73	47.58	3.8	23.39	49.97	3.9	26.96	6.73
4.8	56.21	14.33	4.8	8.77	32.53	4.8	15.97	47.52	4.8	23.56	49.69	4.9	27.22	6.61
5.8	56.42	14.41	5.8	9.42	32.30	5.8	16.21	47.46	5.8	23.74	49.41	5.9	27.48	6.49
6.7	56.63	14.49	6.8	10.10	32.10	6.8	16.45	47.40	6.8	23.93	49.14	6.9	27.72	6.37
7.7	56.84	14.58	7.8	10.79	31.91	7.8	16.67	47.32	7.8	24.12	48.90	7.8	27.95	6.25
8.7	57.04	14.64	8.8	11.48	31.73	8.8	16.88	47.25	8.8	24.32	48.67	8.8	28.19	6.13
9.7	57.25	14.70	9.8	12.16	31.59	9.8	17.10	47.16	9.8	24.51	48.47	9.8	28.42	6.00
10.7	57.47	14.75	10.8	12.81	31.45	10.8	17.33	47.08	10.8	24.70	48.28	10.8	28.67	5.85
11.7	57.71	14.84	11.8	13.41	31.33	11.8	17.60	46.99	11.8	24.88	48.09	11.8	28.94	5.71
12.7	57.95	14.93	12.8	13.98	31.21	12.8	17.86	46.93	12.8	25.05	47.91	12.8	29.22	5.56
13.7	58.20	15.05	13.8	14.54	31.07	13.8	18.14	46.88	13.8	25.21	47.71	13.8	29.53	5.43
14.7	58.45	15.19	14.8	15.08	30.90	14.8	18.43	46.84	14.8	25.37	47.51	14.8	29.85	5.34
15.7	58.69	15.35	15.8	15.66	30.72	15.8	18.72	46.83	15.8	25.54	47.30	15.8	30.17	5.26
16.7	58.93	15.53	16.8	16.27	30.56	16.8	19.00	46.85	16.8	25.71	47.08	16.8	30.50	5.21
17.7	59.15	15.72	17.8	16.94	30.39	17.8	19.27	46.88	17.8	25.91	46.86	17.8	30.79	5.17
18.7	59.35	15.90	18.8	17.64	30.22	18.8	19.52	46.91	18.8	26.12	46.65	18.8	31.08	5.14
19.7	59.55	16.09	19.8	18.38	30.08	19.8	19.76	46.93	19.8	26.34	46.45	19.8	31.35	5.10
20.7	59.74	16.26	20.8	19.13	29.98	20.8	20.00	46.96	20.8	26.57	46.26	20.8	31.61	5.07
21.7	59.94	16.40	21.8	19.88	29.90	21.8	20.24	46.96	21.8	26.78	46.12	21.8	31.88	5.02
22.7	60.13	16.53	22.8	20.59	29.82	22.8	20.47	46.96	22.8	27.00	45.99	22.8	32.14	4.96
23.7	60.35	16.67	23.8	21.28	29.77	23.8	20.71	46.95	23.8	27.19	45.89	23.8	32.41	4.89
24.7	60.56	16.81	24.8	21.93	29.73	24.8	20.97	46.95	24.8	27.39	45.78	24.8	32.69	4.83
25.7	60.78	16.98	25.7	22.57	29.69	25.8	21.25	46.94	25.8	27.59	45.69	25.8	33.00	4.76
26.7	61.00	17.17	26.7	23.18	29.64	26.8	21.52	46.95	26.8	27.77	45.59	26.8	33.30	4.71
27.7	61.21	17.38	27.7	23.80	29.59	27.8	21.80	46.98	27.8	27.95	45.49	27.8	33.62	4.67
28.7	61.46	17.60	28.7	24.41	29.54	28.8	22.09	47.04	28.8	28.14	45.36	28.8	33.95	4.66
29.7	61.67	17.82	29.7	25.02	29.48	29.8	22.37	47.11	29.8	28.32	45.25	29.8	34.28	4.65
30.7	61.89	18.06	30.7	25.67	29.42	30.8	22.65	47.20	30.8	28.52	45.12	30.8	34.61	4.66
31.7	62.08	18.31	31.7	26.35	29.34	31.8	22.92	47.30	31.8	28.74	45.00	31.8	34.92	4.70
9.82 -9.77			30.84 +30.82			10.78 -10.74			9.33 +9.27			12.38 -12.34		
10 ^h 59 ^m 54 ^s .915			12 ^h 14 ^m 28 ^s .804			12 ^h 46 ^m 13 ^s .131			12 ^h 48 ^m 30 ^s .862			13 ^h 27 ^m 23 ^s .749		
-84° 9' 9".97			+88° 9' 16".14			-84° 40' 41".95			+83° 51' 30".88			-85° 22' 0".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Dec.	14 13	-83 17	Dec.	15 2	+87 32	Dec.	15 24	-84 11	Dec.	16 54	+82 10	Dec.	17 16	-80 47
	s	"		s	"		s	"		s	"		s	"
0.9	40.60	44.19	0.9	26.32	33.37	0.9	14.94	48.99	1.0	1.29	24.55	1.0	11.63	14.73
1.9	40.76	43.96	1.9	26.38	33.04	1.9	15.08	48.70	2.0	1.23	24.23	2.0	11.64	14.38
2.9	40.93	43.76	2.9	26.45	32.71	2.9	15.22	48.41	3.0	1.19	23.89	3.0	11.67	14.05
3.9	41.10	43.58	3.9	26.54	32.35	3.9	15.36	48.13	4.0	1.15	23.54	4.0	11.71	13.73
4.9	41.27	43.40	4.9	26.66	31.99	4.9	15.51	47.89	4.9	1.11	23.18	5.0	11.75	13.44
5.9	41.44	43.24	5.9	26.79	31.61	5.9	15.65	47.65	5.9	1.07	22.81	6.0	11.78	13.16
6.9	41.59	43.09	6.9	26.96	31.23	6.9	15.78	47.42	6.9	1.04	22.43	7.0	11.81	12.88
7.9	41.74	42.92	7.9	27.14	30.85	7.9	15.92	47.19	7.9	1.03	22.05	8.0	11.84	12.60
8.9	41.89	42.74	8.9	27.38	30.50	8.9	16.04	46.96	8.9	1.02	21.66	9.0	11.85	12.34
9.9	42.03	42.57	9.9	27.61	30.17	9.9	16.16	46.70	9.9	1.00	21.28	10.0	11.86	12.07
10.9	42.18	42.37	10.9	27.84	29.87	10.9	16.28	46.43	10.9	1.01	20.94	10.9	11.88	11.75
11.9	42.35	42.16	11.9	28.06	29.58	11.9	16.41	46.16	11.9	1.01	20.61	11.9	11.91	11.42
12.9	42.53	41.95	12.9	28.25	29.30	12.9	16.58	45.87	12.9	1.01	20.29	12.9	11.94	11.08
13.9	42.72	41.76	13.9	28.43	29.01	13.9	16.75	45.60	13.9	1.00	19.99	13.9	11.98	10.72
14.9	42.94	41.59	14.9	28.59	28.71	14.9	16.93	45.34	14.9	1.00	19.67	14.9	12.04	10.37
15.9	43.15	41.45	15.9	28.75	28.40	15.9	17.13	45.10	15.9	0.99	19.34	15.9	12.12	10.04
16.9	43.36	41.34	16.9	28.92	28.07	16.9	17.33	44.88	16.9	0.98	18.98	16.9	12.20	9.74
17.9	43.57	41.24	17.9	29.13	27.74	17.9	17.54	44.69	17.9	0.98	18.62	17.9	12.28	9.45
18.9	43.76	41.16	18.9	29.38	27.40	18.9	17.74	44.51	18.9	0.97	18.23	18.9	12.36	9.18
19.8	43.94	41.06	19.9	29.66	27.06	19.9	17.92	44.33	19.9	0.98	17.85	19.9	12.42	8.93
20.8	44.12	40.98	20.9	29.98	26.74	20.9	18.08	44.16	20.9	1.01	17.47	20.9	12.48	8.67
21.8	44.29	40.88	21.9	30.31	26.43	21.9	18.24	43.96	21.9	1.03	17.09	21.9	12.53	8.40
22.8	44.47	40.76	22.9	30.66	26.15	22.9	18.40	43.76	22.9	1.06	16.71	22.9	12.58	8.11
23.8	44.64	40.64	23.9	30.99	25.88	23.9	18.58	43.54	23.9	1.10	16.37	23.9	12.63	7.82
24.8	44.82	40.51	24.9	31.32	25.64	24.9	18.76	43.32	24.9	1.13	16.03	24.9	12.68	7.51
25.8	45.01	40.38	25.9	31.64	25.40	25.9	18.94	43.10	25.9	1.17	15.71	25.9	12.74	7.20
26.8	45.23	40.25	26.9	31.96	25.17	26.9	19.14	42.88	26.9	1.22	15.38	26.9	12.82	6.88
27.8	45.44	40.15	27.9	32.24	24.93	27.9	19.35	42.67	27.9	1.26	15.08	27.9	12.90	6.57
28.8	45.67	40.06	28.9	32.55	24.69	28.9	19.57	42.48	28.9	1.31	14.77	28.9	12.98	6.27
29.8	45.89	39.99	29.9	32.85	24.44	29.9	19.80	42.31	29.9	1.35	14.47	29.9	13.08	5.98
30.8	46.12	39.95	30.9	33.16	24.18	30.9	20.03	42.16	30.9	1.39	14.16	30.9	13.18	5.69
31.8	46.34	39.91	31.8	33.48	23.92	31.9	20.27	42.02	31.9	1.43	13.83	31.9	13.29	5.42
8.57	-8.51		23.31	+23.29		9.89	-9.84		7.34	+7.27		6.25	-6.17	
14 ^h 13 ^m 37 ^s .066			15 ^h 3 ^m 21 ^s .809			15 ^h 24 ^m 9 ^s .966			16 ^h 54 ^m 19 ^s .238			17 ^h 16 ^m 6 ^s .064		
-83° 17' 37".78			+87° 32' 56".60			-84° 11' 42".92			+82° 10' 27".09			-80° 47' 10".43		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "
	17 57	+86 36		18 6	-87 39		18 58	+89 1		19 29	-89 13		20 48	+82 14
1.1	56.32	60.81	1.1	60.36	54.97	1.1	56.61	28.39	1.1	52.37	22.42	1.2	27.45	20.12
2.1	56.09	60.54	2.1	60.26	54.62	2.1	55.60	28.19	2.1	51.47	22.10	2.2	27.30	20.05
3.0	55.87	60.27	3.1	60.20	54.27	3.1	54.56	27.97	3.1	50.66	21.78	3.2	27.14	19.97
4.0	55.65	59.98	4.1	60.16	53.95	4.1	53.49	27.75	4.1	49.95	21.47	4.2	26.99	19.89
5.0	55.43	59.66	5.1	60.16	53.62	5.1	52.41	27.50	5.1	49.30	21.18	5.2	26.82	19.78
6.0	55.23	59.33	6.0	60.14	53.33	6.1	51.33	27.23	6.1	48.70	20.88	6.2	26.66	19.65
7.0	55.04	58.99	7.0	60.11	53.03	7.1	50.31	26.95	7.1	48.10	20.60	7.2	26.50	19.51
8.0	54.87	58.63	8.0	60.08	52.73	8.1	49.36	26.66	8.1	47.46	20.33	8.2	26.33	19.34
9.0	54.73	58.27	9.0	60.01	52.44	9.1	48.51	26.37	9.1	46.75	20.07	9.2	26.18	19.16
10.0	54.59	57.94	10.0	59.93	52.13	10.1	47.74	26.08	10.1	45.98	19.81	10.1	26.03	18.99
11.0	54.49	57.61	11.0	59.87	51.81	11.1	47.03	25.79	11.1	45.18	19.50	11.1	25.90	18.81
12.0	54.39	57.32	12.0	59.81	51.45	12.1	46.36	25.52	12.1	44.38	19.19	12.1	25.77	18.64
13.0	54.26	57.03	13.0	59.78	51.08	13.1	45.68	25.29	13.1	43.62	18.84	13.1	25.64	18.48
14.0	54.13	56.76	14.0	59.79	50.70	14.1	44.96	25.06	14.1	42.97	18.47	14.1	25.52	18.34
15.0	54.00	56.48	15.0	59.85	50.33	15.1	44.18	24.83	15.1	42.46	18.11	15.1	25.39	18.22
16.0	53.86	56.17	16.0	59.95	49.96	16.1	43.35	24.59	16.1	42.09	17.73	16.1	25.26	18.10
17.0	53.70	55.86	17.0	60.09	49.62	17.1	42.50	24.33	17.1	41.83	17.37	17.1	25.12	17.95
18.0	53.56	55.53	18.0	60.23	49.28	18.1	41.64	24.04	18.1	41.62	17.03	18.1	24.98	17.77
19.0	53.45	55.16	19.0	60.38	48.97	19.0	40.82	23.72	19.1	41.42	16.71	19.1	24.83	17.58
20.0	53.35	54.79	20.0	60.48	48.68	20.0	40.09	23.40	20.1	41.20	16.42	20.1	24.69	17.36
21.0	53.27	54.42	21.0	60.57	48.38	21.0	39.44	23.08	21.1	40.93	16.12	21.1	24.55	17.13
21.9	53.22	54.04	22.0	60.66	48.07	22.0	38.89	22.74	22.1	40.57	15.81	22.1	24.41	16.88
22.9	53.18	53.70	23.0	60.71	47.76	23.0	38.41	22.40	23.1	40.17	15.50	23.1	24.30	16.64
23.9	53.17	53.37	23.9	60.79	47.42	24.0	37.99	22.08	24.1	39.75	15.17	24.1	24.19	16.39
24.9	53.15	53.03	24.9	60.86	47.07	25.0	37.62	21.79	25.1	39.34	14.84	25.1	24.08	16.15
25.9	53.14	52.71	25.9	60.94	46.71	26.0	37.26	21.50	26.0	38.97	14.49	26.1	23.98	15.92
26.9	53.12	52.40	26.9	61.07	46.35	27.0	36.89	21.22	27.0	38.66	14.13	27.1	23.89	15.69
27.9	53.11	52.09	27.9	61.23	45.99	28.0	36.51	20.95	28.0	38.43	13.76	28.1	23.79	15.47
28.9	53.08	51.80	28.9	61.40	45.63	29.0	36.09	20.67	29.0	38.30	13.38	29.1	23.69	15.27
29.9	53.05	51.49	29.9	61.62	45.27	30.0	35.65	20.38	30.0	38.27	13.01	30.1	23.58	15.06
30.9	53.03	51.18	30.9	61.87	44.93	31.0	35.20	20.07	31.0	38.34	12.64	31.1	23.48	14.84
31.9	53.00	50.84	31.9	62.14	44.60	32.0	34.74	19.75	32.0	38.48	12.28	32.1	23.38	14.61
16.94	+16.91		24.53	-24.51		58.68	+58.68		73.62	-73.61		7.40	+7.34	
17 ^h	58 ^m	41°.809	18 ^h	6 ^m	47°.620	19 ^h	1 ^m	27°.463	19 ^h	29 ^m	16°.746	20 ^h	48 ^m	36°.323
+86°	36'	51''.12	-87°	39'	51''.38	+89°	1'	7''.53	-89°	13'	21''.02	+82°	13'	43''.34

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Dec.	21 38	-83 5	Dec.	22 16	-86 23	Dec.	22 37	-81 48	Dec.	23 27	+86 52	Dec.	23 47	-82 28
	s	"		s	"		s	"		s	"		s	"
1.2	36.23	47.90	1.2	30.71	5.47	1.2	51.55	39.15	1.3	52.00	3.51	1.3	25.81	22.66
2.2	36.07	47.75	2.2	30.36	5.37	2.2	51.40	39.08	2.3	51.66	3.67	2.3	25.64	22.71
3.2	35.92	47.59	3.2	30.01	5.26	3.2	51.26	39.00	3.3	51.31	3.83	3.3	25.48	22.73
4.2	35.77	47.41	4.2	29.70	5.14	4.2	51.12	38.92	4.3	50.94	3.98	4.3	25.33	22.74
5.2	35.63	47.26	5.2	29.40	5.02	5.2	50.99	38.85	5.3	50.54	4.12	5.3	25.18	22.75
6.2	35.50	47.11	6.2	29.12	4.90	6.2	50.87	38.76	6.3	50.13	4.26	6.3	25.02	22.76
7.2	35.38	46.97	7.2	28.84	4.79	7.2	50.74	38.69	7.3	49.71	4.38	7.3	24.88	22.78
8.2	35.25	46.83	8.2	28.56	4.68	8.2	50.62	38.62	8.3	49.27	4.49	8.3	24.74	22.81
9.2	35.11	46.69	9.2	28.25	4.58	9.2	50.49	38.57	9.3	48.83	4.57	9.3	24.59	22.85
10.2	34.95	46.55	10.2	27.94	4.49	10.2	50.35	38.51	10.3	48.44	4.63	10.3	24.43	22.89
11.2	34.78	46.39	11.2	27.60	4.38	11.2	50.20	38.45	11.3	48.05	4.69	11.3	24.26	22.92
12.2	34.61	46.22	12.2	27.25	4.26	12.2	50.04	38.37	12.3	47.69	4.75	12.3	24.08	22.93
13.2	34.45	46.04	13.2	26.91	4.10	13.2	49.88	38.27	13.3	47.35	4.82	13.3	23.89	22.94
14.2	34.30	45.82	14.2	26.55	3.92	14.2	49.73	38.14	14.2	47.01	4.89	14.3	23.71	22.91
15.2	34.15	45.58	15.2	26.21	3.71	15.2	49.58	37.99	15.2	46.66	4.98	15.3	23.53	22.86
16.2	34.02	45.32	16.2	25.91	3.49	16.2	49.44	37.82	16.2	46.30	5.08	16.3	23.36	22.79
17.2	33.91	45.07	17.2	25.63	3.27	17.2	49.32	37.64	17.2	45.92	5.17	17.3	23.21	22.71
18.2	33.80	44.84	18.2	25.38	3.06	18.2	49.21	37.46	18.2	45.51	5.26	18.3	23.07	22.63
19.2	33.70	44.60	19.2	25.13	2.87	19.2	49.10	37.30	19.2	45.08	5.33	19.2	22.93	22.56
20.2	33.60	44.37	20.2	24.89	2.68	20.2	49.00	37.15	20.2	44.65	5.37	20.2	22.79	22.48
21.2	33.50	44.17	21.2	24.64	2.51	21.2	48.88	37.01	21.2	44.20	5.38	21.2	22.64	22.43
22.2	33.38	43.97	22.2	24.38	2.34	22.2	48.76	36.88	22.2	43.77	5.37	22.2	22.49	22.38
23.1	33.25	43.78	23.2	24.10	2.16	23.2	48.63	36.75	23.2	43.35	5.35	23.2	22.33	22.34
24.1	33.12	43.57	24.2	23.80	1.98	24.2	48.49	36.60	24.2	42.96	5.32	24.2	22.17	22.29
25.1	32.99	43.34	25.2	23.50	1.80	25.2	48.36	36.44	25.2	42.58	5.28	25.2	22.00	22.23
26.1	32.85	43.08	26.2	23.19	1.59	26.2	48.22	36.27	26.2	42.22	5.24	26.2	21.82	22.16
27.1	32.72	42.82	27.2	22.88	1.36	27.2	48.08	36.08	27.2	41.87	5.21	27.2	21.64	22.08
28.1	32.60	42.55	28.2	22.59	1.12	28.2	47.94	35.88	28.2	41.52	5.20	28.2	21.47	21.97
29.1	32.49	42.26	29.2	22.31	0.87	29.2	47.81	35.66	29.2	41.16	5.19	29.2	21.30	21.84
30.1	32.38	41.96	30.2	22.05	0.60	30.2	47.69	35.44	30.2	40.80	5.18	30.2	21.14	21.72
31.1	32.29	41.66	31.2	21.81	0.32	31.2	47.59	35.20	31.2	40.42	5.17	31.2	20.98	21.57
32.1	32.20	41.36	32.1	21.59	0.03	32.2	47.50	34.96	32.2	40.04	5.16	32.2	20.84	21.41
8.32 -8.26			15.86 -15.82			7.02 -6.95			18.30 +18.28			7.63 -7.57		
21 ^h 38 ^m 29 ^s .050			22 ^h 16 ^m 20 ^s .949			22 ^h 37 ^m 45 ^s .323			23 ^h 27 ^m 43 ^s .851			23 ^h 47 ^m 20 ^s .032		
-83° 5' 50''.66			-86° 23' 9''.03			-81° 48' 43''.57			+86° 51' 18''.76			-82° 28' 28''.42		

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Andromedæ. Mag. 4.5		δ Andromedæ. Mag. 3.5		α Cassiopeiæ. (Schedir.) Var. 2.2-2.8		μ Phœnicis. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 34 s	° ' " +28 52 "	h m 0 34 s	° ' " +30 24 "	h m 0 35 s	° ' " +56 5 "	h m 0 37 s	° ' " -46 31 "
Jan. 0.2	14.234	15.65	57.476	60.32	51.874	39.25	28.114	76.32
10.2	14.094 140	14.92 73	57.333 143	59.61 71	51.597 277	38.84 41	27.894 220	76.28 4
20.2	13.954 140	13.94 98	57.190 143	58.63 98	51.321 276	37.92 92	27.683 211	75.76 52
30.2	13.821 133	12.73 121	57.052 138	57.40 123	51.057 264	36.53 139	27.485 198	74.78 98
Feb. 9.1	13.701 120	11.35 138	56.929 123	55.99 141	50.816 241	34.73 180	27.309 176	73.36 142
	102	149	104	153	203	213	149	184
19.1	13.599	9.86	56.825	54.46	50.613	32.60	27.160	71.52
Mar. 1.1	13.527 72	8.32 154	56.750 75	52.86 100	50.459 154	30.22 238	27.045 115	69.31 221
11.1	13.488 39	6.81 151	56.710 40	51.28 158	50.364 95	27.69 253	26.969 76	66.79 252
21.0	13.489 1	5.39 142	56.710 0	49.79 149	50.335 29	25.13 256	26.937 32	64.01 278
31.0	13.533 44	4.16 123	56.756 46	48.47 132	50.381 46	22.64 249	26.955 18	61.03 298
	94	100	95	108	119	233	69	312
Apr. 10.0	13.627	3.16	56.851	47.39	50.500	20.31	27.024	57.91
19.9	13.769 142	2.45 71	56.994 143	46.61 78	50.696 196	18.27 204	27.148 124	54.70 321
29.9	13.956 187	2.08 37	57.185 191	46.14 47	50.962 266	16.57 170	27.325 177	51.48 322
May 9.9	14.188 232	2.05 3	57.420 235	46.05 9	51.294 332	15.29 128	27.554 229	48.31 317
19.9	14.459 271	2.41 36	57.694 274	46.34 29	51.681 387	14.46 83	27.831 277	45.28 303
	304	72	307	65	433	35	318	285
29.8	14.763	3.13	58.001	46.99	52.114	14.11	28.149	42.43
June 8.8	15.088 325	4.21 108	58.332 331	48.02 103	52.579 465	14.27 16	28.502 353	39.85 258
18.8	15.430 342	5.61 140	58.679 347	49.37 135	53.065 486	14.92 65	28.879 377	37.59 226
28.8	15.779 349	7.30 169	59.033 354	51.04 167	53.560 495	16.05 113	29.271 392	35.70 189
July 8.7	16.124 345	9.23 193	59.382 349	52.95 191	54.048 488	17.63 158	29.669 398	34.26 144
	335	213	339	213	473	198	392	98
18.7	16.459	11.36	59.721	55.08	54.521	19.61	30.061	33.28
28.7	16.774 315	13.61 225	60.042 321	57.35 227	54.966 445	21.94 233	30.436 375	32.79 49
Aug. 7.6	17.064 290	15.96 235	60.335 293	59.73 238	55.373 407	24.58 264	30.784 348	32.81 2
17.6	17.322 258	18.33 237	60.597 262	62.14 241	55.736 363	27.45 287	31.097 313	33.32 51
27.6	17.544 222	20.69 236	60.823 226	64.55 241	56.050 314	30.52 307	31.366 269	34.31 99
	185	228	189	236	258	317	219	142
Sept. 6.6	17.729	22.97	61.012	66.91	56.308	33.69	31.585	35.73
16.5	17.873 144	25.15 218	61.159 147	69.16 225	56.510 202	36.91 322	31.750 165	37.53 180
26.5	17 978 105	27.17 202	61.268 109	71.26 210	56.653 143	40.12 321	31.860 110	39.64 211
Oct. 6.5	18.046 68	29.03 186	61.337 69	73.20 194	56.739 86	43.25 313	31.914 54	41.97 233
16.5	18.077 31	30.66 163	61.370 33	74.93 173	56.769 30	46.23 298	31.913 1	44.43 246
	1	142	1	152	24	279	51	248
26.4	18.076	32.08	61.371	76.45	56.745	49.02	31.862	46.91
Nov. 5.4	18.043 33	33.24 116	61.339 32	77.70 125	56.671 74	51.54 252	31.766 96	49.32 241
15.4	17.984 59	34.14 90	61.281 58	78.68 98	56.549 122	53.74 220	31.630 136	51.55 223
25.3	17.902 82	34.74 60	61.198 83	79.37 69	56.383 166	55.55 181	31.461 169	53.52 197
Dec. 5.3	17.800 102	35.06 32	61.095 103	79.77 40	56.180 203	56.94 139	31.269 192	55.14 162
	119	2	122	7	234	91	211	122
15.3	17.681	35.08	60.973	79.84	55.946	57.85	31.058	56.36
25.3	17.550 131	34.79 29	60.839 134	79.59 25	55.686 260	58.25 40	30.837 221	57.12 76
35.2	17.410 140	34.22 57	60.696 143	79.05 54	55.410 276	58.15 10	30.614 223	57.41 29
Mean Place	13.118	0.11	56.351	44.28	50.661	16.18	27.122	67.43
Sec δ, Tan δ	1.142	+0.551	1.160	+0.587	1.792	+1.488	1.454	-1.055
D _ψ α, D _ω α	+0.06	-0.04	+0.06	-0.04	+0.07	-0.10	+0.06	+0.07
D _ψ δ, D _ω δ	+0.4	+0.1	+0.4	+0.2	+0.4	+0.2	+0.4	+0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	η Cassiopeiæ. Mag. 3.6		δ Piscium. Mag. 4.6		λ Hydri. Mag. 5.0		20 Ceti. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 44 s	° ' " +57 22 "	h m 0 44 s	° ' " + 7 8 "	h m 0 45 s	° ' " -75 21 "	h m 0 48 s	° ' " - 1 34 "
Jan. 0.3	9.144	78.02	26.725	28.60	46.24	83.19	50.092	76.03
10.2	8.859 285	77.71 31	26.612 113	27.88 72	45.44 80	82.58 61	49.979 113	76.71 68
20.2	8.571 288	76.88 83	26.498 114	27.15 73	44.67 77	81.37 121	49.864 115	77.32 61
30.2	8.293 278	75.58 130	26.388 110	26.41 74	43.95 72	79.59 178	49.753 111	77.83 51
Feb. 9.1	8.039 254	73.86 172	26.286 102	25.73 68	43.30 65	77.30 220	49.650 103	78.22 39
	217	210	87	62	57	274	89	24
19.1	7.822	71.76	26.199	25.11	42.73	74.56	49.561	78.46
Mar. 1.1	7.652 170	69.41 235	26.135 64	24.59 52	42.27 46	71.44 312	49.494 67	78.53 7
11.1	7.542 110	66.88 253	26.098 37	24.22 87	41.92 35	68.02 342	49.452 42	78.41 12
21.0	7.501 41	64.29 259	26.092 6	24.05 17	41.69 23	64.40 362	49.443 9	78.07 34
31.0	7.535 34	61.75 254	26.126 34	24.08 3	41.60 9	60.65 375	49.470 27	77.51 56
	111	240	74	28	4	381	67	81
Apr. 10.0	7.646	59.35	26.200	24.36	41.64	56.84	49.537	76.70
20.0	7.836 190	57.21 214	26.316 116	24.89 53	41.80 16	53.06 378	49.645 108	75.66 104
29.9	8.100 264	55.39 182	26.475 159	25.70 81	42.10 30	49.39 367	49.795 150	74.37 129
May 9.9	8.434 334	53.97 142	26.673 198	26.77 107	42.54 44	45.93 346	49.985 190	72.87 150
19.9	8.827 393	53.00 97	26.907 234	28.08 131	43.09 55	42.72 321	50.212 227	71.17 170
	441	49	266	153	65	287	258	185
29.8	9.268	52.51	27.173	29.61	43.74	39.85	50.470	69.32
June 8.8	9.746 478	52.52 1	27.462 289	31.33 172	44.48 74	37.39 246	50.752 282	67.37 196
18.8	10.249 503	53.02 50	27.770 308	33.18 185	45.31 83	35.40 199	51.053 301	65.36 201
28.8	10.761 512	54.00 98	28.085 315	35.13 195	46.17 86	33.90 150	51.364 311	63.33 203
July 8.7	11.271 510	55.44 144	28.401 316	37.12 199	47.07 90	32.98 92	51.676 312	61.35 198
	494	186	308	198	89	87	306	189
18.7	11.765	57.30	28.709	39.10	47.96	32.61	51.982	59.46
28.7	12.234 469	59.54 224	29.002 293	41.02 192	48.82 86	32.83 22	52.275 293	57.71 175
Aug. 7.7	12.667 433	62.08 254	29.275 273	42.82 180	49.64 82	33.63 80	52.548 273	56.16 155
17.6	13.056 389	64.87 279	29.519 244	44.47 165	50.38 74	34.98 135	52.793 245	54.83 133
27.6	13.394 338	67.88 301	29.732 213	45.94 147	51.01 63	36.84 186	53.008 215	53.75 108
	284	313	178	125	51	231	182	81
Sept. 6.6	13.678	71.01	29.910	47.19	51.52	39.15	53.190	52.94
16.5	13.904 226	74.22 321	30.054 144	48.23 104	51.90 38	41.82 267	53.336 146	52.38 56
26.5	14.071 167	77.43 321	30.162 108	49.03 80	52.12 22	44.75 293	53.446 110	52.10 28
Oct. 6.5	14.179 108	80.58 315	30.234 72	49.60 57	52.19 7	47.84 309	53.520 74	52.06 4
16.5	14.227 48	83.62 304	30.274 40	49.95 35	52.10 9	50.97 313	53.562 42	52.26 20
	7	285	9	14	25	304	11	37
26.4	14.220	86.47	30.283	50.09	51.85	54.01	53.573	52.63
Nov. 5.4	14.160 60	89.05 258	30.266 17	50.05 4	51.47 38	56.85 284	53.556 17	53.16 53
15.4	14.049 111	91.34 229	30.225 41	49.83 22	50.95 52	59.36 251	53.516 40	53.81 65
25.4	13.893 156	93.25 191	30.162 63	49.48 35	50.33 62	61.46 210	53.455 61	54.56 75
Dec. 5.3	13.694 199	94.74 149	30.083 79	49.01 47	49.62 71	63.06 160	53.375 80	55.34 78
	234	103	94	57	77	102	94	79
15.3	13.460	95.77	29.989	48.44	48.85	64.08	53.281	56.13
25.3	13.197 263	96.29 52	29.884 105	47.79 65	48.05 80	64.50 42	53.176 105	56.91 78
35.2	12.915 282	96.27 2	29.771 113	47.08 71	47.24 81	64.30 20	53.063 113	57.64 73
Mean Place	7.807	54.75	25.582	20.61	45.358	69.93	48.940	80.88
Sec δ, Tan δ	1.855	+1.563	1.008	+0.125	3.959	-3.830	1.000	-0.028
D _μ α, D _μ α	+0.07	-0.10	+0.06	-0.01	+0.04	+0.26	+0.06	0.00
D _μ δ, D _μ δ	+0.4	+0.2	+0.4	+0.2	+0.4	+0.2	+0.4	+0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Phoenicis. Mag. 3.4				μ Cassiopeiae. Mag. 5.3				η Ceti. Mag. 3.6				β Andromedae. Mag. 2.4			
	Right Ascension.		Declina- tion.		Right Ascension.		Declina- tion.		Right Ascension.		Declina- tion.		Right Ascension.		Declina- tion.	
	h m		° '		h m		° '		h m		° '		h m		° '	
	1	2	-47	8	1	2	+54	31	1	4	-10	36	1	5	+35	11
Jan. 0.3	26.641		97.90		49.733		29.83		29.102		57.94		9.510		27.18	
10 2	26.409	232	98.13	23	49.487	246	29.68	15	28.983	119	58.63	69	9.356	154	26.74	44
20 2	26.180	229	97.87	26	49.232	255	29.01	67	28.860	123	59.14	51	9.195	161	25.97	77
30 2	25.958	222	97.12	75	48.979	253	27.87	114	28.739	121	59.44	30	9.033	162	24.91	108
Feb. 9.2	25.752	206	95.89	123	48.743	236	26.31	156	28.625	114	59.54	10	8.880	153	23.61	130
		193		167		209		191		103		13		137		159
10 1	25.509		94.22		48.534		24.40		28.522		59.41		8.743		22.11	
Mar. 1.1	25.417	152	92.16	206	48.365	169	22.20	220	28.437	85	59.06	35	8.632	111	20.47	164
11 1	25.302	116	89.76	240	48.247	118	19.83	237	28.379	58	58.46	60	8.554	78	18.78	109
21 0	25.231	71	87.04	272	48.191	56	17.36	247	28.352	27	57.62	84	8.518	36	17.13	165
31 0	25.208	23	84.09	295	48.203	12	14.91	245	28.360	8	56.53	109	8.530	12	15.57	156
		30		313		85		234		47		132		62		139
Apr. 10 0	25.238		80.96		48.288		12.57		28.407		55.21		8.592		14.18	
20 0	25.323	85	77.71	325	48.446	158	10.45	212	28.498	91	53.67	154	8.708	116	13.05	113
29 0	25.406	143	74.42	329	48.677	231	8.62	183	28.631	133	51.91	176	8.876	168	12.21	84
May 9 0	25.602	190	71.15	327	48.974	297	7.15	147	28.805	174	49.99	192	9.093	217	11.70	51
19 0	25.909	247	67.97	318	49.330	356	6.10	105	29.018	213	47.94	205	9.356	263	11.56	14
		294		300		408		60		247		216		302		24
29 0	26.203		64.97		49.738		5.50		29.265		45.78		9.658		11.80	
June 8 8	26.530	333	62.19	278	50.185	447	5.37	13	29.540	275	43.59	219	9.990	332	12.42	62
18 8	26.900	304	59.73	246	50.659	474	5.71	34	29.835	295	41.41	218	10.344	354	13.40	98
28 8	27.285	345	57.04	209	51.149	490	6.52	81	30.145	310	39.31	210	10.710	366	14.72	132
July 8 7	27.681	396	55.98	166	51.640	491	7.76	124	30.460	315	37.32	199	11.079	399	16.34	162
		397		120		484		165		311		181		363		195
18 7	28.078		54.78		52.124		9.41		30.771		35.51		11.442		18.20	
28 7	28.464	390	54.09	69	52.586	462	11.42	201	31.071	300	33.94	157	11.789	347	20.28	208
Aug. 7 7	28.828	364	53.90	19	53.020	434	13.74	232	31.353	282	32.63	131	12.116	327	22.52	234
17 6	29.162	334	54.24	34	53.417	397	16.32	258	31.610	257	31.62	101	12.414	296	24.86	234
27 6	29.456	304	55.08	84	53.771	354	19.09	277	31.840	230	30.93	69	12.679	265	27.25	239
		240		132		304		292		196		36		228		239
Sept. 6 6	29.705		56.40		54.075		22.01		32.036		30.57		12.907		29.64	
16 6	29.903	198	58.13	173	54.328	253	25.01	300	32.196	160	30.51	6	13.097	190	32.00	236
26 5	30.045	142	60.22	309	54.527	199	28.02	301	32.321	125	30.76	25	13.247	150	34.27	27
Oct. 6 5	30.133	88	62.57	233	54.673	146	31.00	298	32.410	89	31.28	32	13.358	111	36.40	213
16 5	30.166	33	65.11	254	54.764	91	33.88	294	32.465	55	32.04	76	13.431	73	38.38	195
		19		261		38		272		22		92		36		173
26 4	30.147		67.72		54.862		36.60		32.487		32.96		13.467		40.17	
Nov. 5 4	30.078	9	70.28	236	54.791	11	39.09	349	32.480	7	34.02	106	13.470	3	41.73	134
15 4	29.967	111	72.72	24	54.731	8	41.30	221	32.446	34	35.16	114	13.439	31	43.04	131
25 4	29.817	180	74.91	219	54.623	108	43.20	190	32.390	56	36.31	115	13.378	61	44.07	128
Dec. 5 3	29.628	159	76.79	18	54.477	148	44.69	149	32.312	73	37.44	113	13.290	98	44.39	11
		20		160		154		107		83		106		113		6
15 3	29.423		78.58		54.283		45.76		32.219		38.50		13.177		45.32	
25 3	29.212	231	80.22	154	54.077	218	48.37	61	32.113	136	39.44	94	13.044	133	45.39	1
31 3	28.967	32	80.36	5	53.837	240	48.48	11	31.994	119	40.25	51	12.894	139	45.28	2
Mean Place	23 486		28.17		48.178		7.46		27.380		59.52		8.114		9.95	
Sec. 2. Day 2	1 471		-1 074		1 723		-1 408		1 017		-0 187		1 223		+0 795	
16 1 16 1	-0 03		-0 07		-0 07		-0 09		-0 06		-0 01		-0 07		-0 05	
16 1 16 1	-0 14		-0 23		-0 14		-0 23		-0 14		-0 23		-0 14		-0 23	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	τ Piscium. Mag. 4.7		ζ Piscium. Mag. 5.6		κ Tucanæ. Mag. 5.0		f Piscium. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 7 s	° ' " +29 39 "	h m 1 9 s	° ' " + 7 8 "	h m 1 12 s	° ' " -69 18 "	h m 1 13 s	° ' " + 3 10 "
Jan. 0.3	9.767	32.15	28.028	39.21	60.61	54.90	35.391	64.97
10.2	9.628 139	31.66 49	27.915 113	38.52 69	60.06 55	54.82 8	35.279 112	64.25 72
20.2	9.481 147	30.89 77	27.796 119	37.81 71	59.51 55	54.14 68	35.158 121	63.58 67
30.2	9.334 147	29.89 100	27.676 120	37.12 69	58.98 53	52.88 126	35.038 120	62.96 62
Feb. 9.2	9.194 140	28.69 120	27.562 114	36.46 66	58.48 50	51.08 180	34.923 115	62.42 54
	125	134	104	59	45	229	106	44
19.1	9.069	27.35	27.458	35.87	58.03	48.79	34.817	61.98
Mar. 1.1	8.965 104	25.93 142	27.373 85	35.38 49	57.66 37	46.07 272	34.729 88	61.67 81
	71	144	59	36	31	307	63	14
11.1	8.894	24.49	27.314	35.02	57.35	43.00	34.666	61.53
21.1	8.860 34	23.09 140	27.286 28	34.85 17	57.13 22	39.64 336	34.633 33	61.59 6
31.0	8.869 9	21.82 127	27.294 8	34.87 2	57.00 13	36.07 357	34.637 4	61.83 24
	58	107	48	25	5	370	42	49
Apr. 10.0	8.927	20.75	27.342	35.12	56.95	32.37	34.679	62.32
20.0	9.035 108	19.90 85	27.434 92	35.61 49	57.01 6	28.62 375	34.764 85	63.05 78
29.9	9.192 157	19.36 54	27.569 135	36.37 76	57.17 16	24.91 371	34.894 130	64.03 98
May 9.9	9.398 206	19.15 21	27.747 178	37.36 99	57.44 27	21.31 360	35.066 172	65.24 121
19.9	9.646 248	19.26 11	27.963 216	38.61 125	57.79 35	17.90 341	35.274 208	66.66 142
	284	48	251	145	43	313	246	162
29.9	9.930	19.74	28.214	40.06	58.22	14.77	35.520	68.28
June 8.8	10.245 315	20.56 82	28.491 277	41.71 165	58.74 52	11.97 280	35.794 274	70.06 178
18.8	10.581 336	21.71 115	28.790 299	43.49 178	59.31 57	9.59 238	36.087 293	71.93 187
28.8	10.930 349	23.13 142	29.102 312	45.37 188	59.93 62	7.67 192	36.392 305	73.85 192
July 8.8	11.281 351	24.83 170	29.417 315	47.29 192	60.59 66	6.28 139	36.704 312	75.78 198
	347	190	312	192	66	84	311	192
18.7	11.628	26.73	29.729	49.21	61.25	5.44	37.015	77.70
28.7	11.962 334	28.79 206	30.029 300	51.07 186	61.91 66	5.18 26	37.316 301	79.50 180
Aug. 7.7	12.274 312	30.95 216	30.314 285	52.83 176	62.54 63	5.52 34	37.598 282	81.16 166
17.6	12.560 286	33.16 221	30.574 260	54.44 161	63.12 58	6.42 90	37.859 261	82.64 148
27.6	12.814 254	35.39 223	30.806 232	55.88 144	63.64 52	7.88 146	38.093 234	83.94 130
	220	219	200	122	45	195	203	108
Sept. 6.6	13.034	37.58	31.006	57.10	64.09	9.83	38.296	84.97
16.6	13.218 184	39.68 210	31.174 168	58.11 161	64.44 35	12.20 237	38.464 168	85.76 79
26.5	13.363 145	41.68 200	31.306 132	58.87 76	64.68 24	14.93 273	38.598 134	86.30 54
Oct. 6.5	13.471 108	43.53 185	31.405 99	59.42 55	64.82 14	17.90 297	38.700 102	86.60 30
16.5	13.542 71	45.19 166	31.471 66	59.73 31	64.85 3	21.01 311	38.769 69	86.67 7
	38	147	35	12	9	312	39	14
26.5	13.580	46.66	31.506	59.85	64.76	24.13	38.808	86.53
Nov. 5.4	13.586 6	47.91 125	31.513 7	59.79 6	64.57 19	27.13 300	38.816 8	86.23 30
15.4	13.561 25	48.93 102	31.493 20	59.55 24	64.29 28	29.91 278	38.799 17	85.79 44
25.4	13.509 52	49.68 75	31.450 43	59.19 36	63.92 37	32.33 242	38.757 42	85.23 56
Dec. 5.3	13.431 78	50.18 50	31.386 64	58.71 48	63.48 44	34.33 200	38.694 63	84.59 64
	100	21	81	56	49	149	80	71
15.3	13.331	50.39	31.305	58.15	62.99	35.82	38.614	83.88
25.3	13.211 120	50.33 6	31.207 98	57.51 64	62.45 54	36.74 92	38.516 98	83.17 71
35.3	13.076 135	49.98 35	31.098 109	56.82 69	61.90 55	37.06 32	38.406 110	82.44 78
Mean Place	8.389	16.72	26.730	31.45	59.349	42.14	34.081	58.65
Sec δ, Tan δ	1.151	+0.569	1.008	+0.125	2.830	-2.648	1.002	+0.056
D _α α, D _α α	+0.07	-0.04	+0.06	-0.01	+0.04	+0.18	+0.06	0.00
D _δ δ, D _α δ	+0.4	+0.3	+0.4	+0.3	+0.4	+0.3	+0.4	+0.3

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ν Piscium. Mag. 4.7			θ Ceti. Mag. 3.8			δ Cassiopeiae. Mag. 2.8			γ Phoenicis. Mag. 3.4		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 1 14	s	° ' "	h m 1 19	s	° ' "	h m 1 20	s	° ' "	h m 1 24	s	° ' "
			+26 50			- 8 35			+59 48			-43 43
Jan. 0.3	58.733		14.75	56.757		79.92	28.254		58.19	49.619		86.12
10.3	58.600 ¹³³		14.26 ⁴⁹	56.639 ¹¹⁸		80.66 ⁷⁴	27.949 ³⁰⁵		58.37 ¹⁸	49.406 ²¹³		86.67 ⁵⁵
20.2	58.459 ¹⁴¹		13.53 ⁷³	56.514 ¹²⁵		81.24 ⁵⁸	27.628 ³²¹		58.02 ³⁵	49.187 ²¹⁹		86.74 ⁷
30.2	58.316 ¹⁴³		12.60 ⁹³	56.388 ¹²⁶		81.64 ⁴⁰	27.304 ³²⁴		57.15 ⁸⁷	48.971 ²¹⁶		86.32 ⁴²
Feb. 9.2	58.177 ¹³⁹		11.50 ¹¹⁰	56.265 ¹²³		81.84 ²⁰	26.994 ³¹⁰		55.81 ¹³⁴	48.765 ²⁰⁶		85.41 ⁹¹
19.1	58.051 ¹²⁶		10.28 ¹²²	56.153 ¹¹²		81.84 ⁰	26.710 ²⁸⁴		54.05 ¹⁷⁶	48.575 ¹⁹⁰		84.08 ¹³³
Mar. 1.1	57.945 ¹⁰⁶		8.99 ¹²⁹	56.057 ⁹⁶		81.61 ²³	26.470 ²⁴⁰		51.94 ²¹¹	48.409 ¹⁶⁶		82.33 ¹⁷⁵
11.1	57.869 ⁷⁶		7.69 ¹³⁰	55.985 ⁷²		81.16 ⁴⁵	26.287 ¹⁸³		49.59 ²³⁵	48.276 ¹³³		80.20 ²¹³
21.1	57.830 ³⁹		6.45 ¹²⁴	55.942 ⁴³		80.45 ⁷¹	26.172 ¹¹⁵		47.08 ²⁵¹	48.181 ⁹⁵		77.75 ²⁴⁵
31.0	57.832 ²		5.35 ¹¹⁰	55.935 ⁷		79.52 ⁹³	26.136 ³⁶		44.52 ²⁵⁶	48.131 ⁵⁰		75.03 ²⁷²
Apr. 10.0	57.880 ⁴⁸		4.42 ⁹³	55.967 ³²		78.33 ¹¹⁹	26.183 ⁴⁷		42.01 ²⁵¹	48.131 ⁰		72.08 ²⁹⁵
20.0	57.978 ⁹⁸		3.73 ⁶⁹	56.042 ⁷⁵		76.92 ¹⁴¹	26.316 ¹³³		39.66 ²³⁵	48.184 ⁵³		68.97 ³¹¹
30.0	58.124 ¹⁴⁶		3.32 ⁴¹	56.160 ¹¹⁸		75.29 ¹⁶³	26.531 ²¹⁵		37.57 ²⁰⁹	48.291 ¹⁰⁷		65.77 ³²¹
May 9.9	58.317 ¹⁹³		3.22 ¹⁰	56.321 ¹⁶¹		73.48 ¹⁸¹	26.827 ²⁹⁶		35.81 ¹⁷⁶	48.452 ¹⁶¹		62.54 ³²⁵
19.9	58.553 ²³⁶		3.45 ²³	56.522 ²⁰¹		71.52 ¹⁹⁶	27.193 ³⁶⁶		34.42 ¹³⁹	48.664 ²¹²		59.36 ³¹⁵
29.9	58.827 ²⁷⁴		4.01 ⁵⁶	56.757 ²³⁵		69.45 ²⁰⁷	27.623 ⁴³⁰		33.48 ⁹⁴	48.924 ²⁶⁰		56.30 ³⁰⁴
June 8.8	59.131 ³⁰⁴		4.88 ⁸⁷	57.022 ²⁶⁵		67.31 ²¹⁴	28.099 ⁴⁷⁶		33.01 ⁴⁷	49.224 ³⁰⁰		53.42 ²⁸⁸
18.8	59.457 ³²⁶		6.06 ¹¹⁸	57.310 ²⁸⁸		65.16 ²¹⁵	28.613 ⁵¹⁴		33.02 ¹	49.557 ³³³		50.81 ²⁶
28.8	59.796 ³³⁹		7.50 ¹⁴⁴	57.614 ³⁰⁴		63.07 ²⁰⁹	29.149 ⁵³⁶		33.51 ⁴⁹	49.916 ³⁵⁹		48.52 ²²
July 8.8	60.141 ³⁴⁵		9.18 ¹⁶⁸	57.925 ³¹¹		61.07 ²⁰⁰	29.694 ⁵⁴⁵		34.45 ⁹⁴	50.289 ³⁷³		46.63 ¹⁹
18.7	60.482 ³⁴¹		11.03 ¹⁸⁵	58.235 ³¹⁰		59.22 ¹⁸⁵	30.233 ⁵³⁹		35.84 ¹³⁹	50.668 ³⁷⁹		45.17 ¹⁴
28.7	60.811 ³²⁹		13.02 ¹⁹⁹	58.536 ³⁰¹		57.60 ¹⁶²	30.758 ⁵²⁵		37.63 ¹⁷⁹	51.040 ³⁷²		44.19 ⁹
Aug. 7.7	61.121 ³¹⁰		15.09 ²⁰⁷	58.823 ²⁸⁷		56.21 ¹³⁹	31.254 ⁴⁹⁶		39.79 ²¹⁶	51.396 ³⁵⁶		43.71 ⁴
17.7	61.407 ²⁸⁶		17.21 ²¹²	59.087 ²⁶⁴		55.11 ¹¹⁰	31.712 ⁴⁵⁸		42.26 ²⁴⁷	51.729 ³³³		43.77 ¹
27.6	61.662 ²⁵⁵		19.30 ²⁰⁹	59.325 ²³⁸		54.31 ⁸⁰	32.126 ⁴¹⁴		44.97 ²⁷¹	52.028 ²⁹⁹		44.33 ⁵
Sept. 6.6	61.885 ²²³		21.35 ²⁰⁵	59.532 ²⁰⁷		53.82 ⁴⁹	32.489 ³⁶³		47.88 ²⁹¹	52.288 ²⁶⁰		45.38 ¹⁰⁵
16.6	62.073 ¹⁸⁸		23.31 ¹⁹⁶	59.705 ¹⁷³		53.67 ¹⁵	32.796 ³⁰⁷		50.94 ³⁰⁶	52.503 ²¹⁵		46.88 ¹⁵⁰
26.5	62.224 ¹⁵¹		25.14 ¹⁸³	59.845 ¹⁴⁰		53.81 ¹⁴	33.045 ²⁴⁹		54.07 ³¹³	52.669 ¹⁶⁶		48.76 ¹⁸⁶
Oct. 6.5	62.339 ¹¹⁵		26.81 ¹⁶⁷	59.949 ¹⁰⁴		54.22 ⁴¹	33.231 ¹⁸⁶		57.22 ³¹⁵	52.785 ¹¹⁶		50.96 ²²⁰
16.5	62.419 ⁸⁰		28.31 ¹⁵⁰	60.019 ⁷⁰		54.88 ⁶⁶	33.357 ¹²⁶		60.32 ³¹⁰	52.849 ⁶⁴		53.39 ²⁴³
26.5	62.467 ⁴⁸		29.62 ¹³¹	60.059 ⁴⁰		55.72 ⁸⁴	33.422 ⁶⁵		63.30 ²⁹⁸	52.865 ¹⁶		55.96 ²⁵⁷
Nov. 5.4	62.482 ¹⁵		30.71 ¹⁰⁹	60.067 ⁸		56.71 ⁹⁹	33.425 ³		66.11 ²⁸¹	52.834 ³¹		58.54 ²⁵²
15.4	62.466 ¹⁶		31.59 ⁸⁸	60.048 ¹⁹		57.80 ¹⁰⁹	33.368 ⁵⁷		68.67 ²⁵⁶	52.760 ⁷⁴		61.04 ²⁵⁴
25.4	62.424 ⁴²		32.22 ⁶³	60.005 ⁴³		58.92 ¹¹²	33.255 ¹¹³		70.93 ²²⁶	52.647 ¹¹³		63.38 ²³
Dec. 5.4	62.356 ⁶⁸		32.62 ⁴⁰	59.938 ⁶⁷		60.04 ¹¹²	33.088 ¹⁶⁷		72.82 ¹⁸⁹	52.502 ¹⁴⁵		65.43 ²⁰¹
15.3	62.265 ⁹¹		32.76 ¹⁴	59.853 ⁸⁵		61.10 ¹⁰⁶	32.871 ²¹⁷		74.28 ¹⁴⁶	52.331 ¹⁷¹		67.14 ¹⁷
25.3	62.153 ¹¹²		32.65 ¹¹	59.752 ¹⁰¹		62.08 ⁹⁸	32.611 ²⁶⁰		75.27 ⁹⁹	52.137 ¹⁹⁴		68.45 ¹³
35.3	62.025 ¹²⁸		32.29 ³⁶	59.637 ¹¹⁵		62.93 ⁸⁵	32.317 ²⁹⁴		75.76 ⁴⁹	51.927 ²¹⁰		69.31 ⁸
Mean Place	57.311		0.34	55.442		82.05	26.346		35.06	48.322		77.77
Sec δ , Tan δ	1.121		+0.506	1.011		-0.151	1.989		+1.719	1.384		-0.957
$D\alpha$, $D_{\alpha}\alpha$	+0.06		-0.03	+0.06		+0.01	+0.08		-0.11	+0.05		+0.06
$D\delta$, $D_{\delta}\delta$	+0.4		+0.3	+0.4		+0.3	+0.4		+0.3	+0.4		+0.4

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	π Piscium. Mag. 5.6			υ Persei. Mag. 3.8			α Eridani. (Achernar.) Mag. 0.6			ω Cassiopeia. Mag. 5.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 1 32	s	° ' "	h m 1 32	s	° ' "	h m 1 34	s	° ' "	h m 1 36	s	° ' "
Jan. 0.3	46.388		29.81	58.832		67.75	41.088		82.47	17.33		68.12
10.3	46.274 ¹¹⁴		29.20 ⁶¹	58.631 ²⁰¹		67.79 ⁴	40.756 ³³²		82.92 ⁴⁵	16.91 ⁴²		68.68 ⁵⁶
20.2	46.151 ¹²³		28.52 ⁶⁸	58.411 ²²⁰		67.40 ³⁹	40.417 ³³⁹		82.81 ¹¹	16.44 ⁴⁷		68.66 ²
30.2	46.023 ¹²⁸		27.80 ⁷²	58.186 ²²⁵		66.59 ⁸¹	40.082 ³³⁵		82.14 ⁶⁷	15.98 ⁴⁶		68.08 ⁵⁸
Feb. 9.2	45.895 ¹²⁸		27.07 ⁷³	57.964 ²²²		65.39 ¹²⁰	39.760 ³²²		80.94 ¹²⁰	15.54 ⁴⁴		66.96 ¹¹²
		119	60		205	153		297	170	41		161
19.2	45.776 ¹⁰⁴		26.38 ⁶⁵	57.759 ¹⁷⁸		63.86 ¹⁸⁰	39.463 ²⁶⁴		79.24 ²¹⁷	15.13 ³⁷		65.35 ²⁰⁴
Mar. 1.1	45.672 ⁸¹		25.73 ⁵⁶	57.581 ¹⁴¹		62.06 ¹⁹⁹	39.199 ²²¹		77.07 ²⁵⁶	14.76 ³⁰		63.31 ²³⁷
11.1	45.591 ⁵¹		25.17 ⁴³	57.440 ⁹¹		60.07 ²¹⁰	38.978 ¹⁷⁰		74.51 ²⁸⁹	14.46 ²⁰		60.94 ²⁶¹
21.1	45.540 ¹⁴		24.74 ²⁴	57.349 ³⁴		57.97 ²¹¹	38.808 ¹¹¹		71.62 ³¹⁹	14.26 ¹⁰		58.33 ²⁷³
31.0	45.526 ²⁶		24.50 ⁵	57.315 ²⁸		55.86 ²⁰³	38.697 ⁴⁷		68.43 ³³⁸	14.16 ⁰		55.60 ²⁷⁴
Apr. 10.0	45.552 ⁷¹		24.45 ¹⁹	57.343 ⁹⁴		53.83 ¹⁸⁷	38.650 ²²		65.05 ³⁵²	14.16 ¹²		52.86 ²⁶⁵
20.0	45.623 ¹¹⁶		24.64 ⁴²	57.437 ¹⁵⁹		51.96 ¹⁶²	38.672 ⁹³		61.53 ³⁵⁷	14.28 ²³		50.21 ²⁴⁶
30.0	45.739 ¹⁶⁰		25.06 ⁶⁹	57.596 ²²²		50.34 ¹³²	38.765 ¹⁶²		57.96 ³⁵⁵	14.51 ³³		47.75 ²¹⁷
May 9.9	45.899 ²⁰¹		25.75 ⁹³	57.818 ²⁸⁰		49.02 ⁹⁶	38.927 ²³⁰		54.41 ³⁴⁵	14.84 ⁴³		45.58 ¹⁸¹
19.9	46.100 ²³⁷		26.68 ¹¹⁸	58.098 ³³⁰		48.06 ⁵⁷	39.157 ²⁹³		50.96 ³²⁷	15.27 ⁵²		43.77 ¹⁴⁰
29.9	46.337 ²⁷⁰		27.86 ¹³⁹	58.428 ³⁷¹		47.49 ¹⁵	39.450 ³⁴⁹		47.69 ³⁰¹	15.79 ⁵⁸		42.37 ⁹³
June 8.9	46.607 ²⁹³		29.25 ¹⁵⁷	58.799 ⁴⁰³		47.34 ²⁷	39.799 ³⁹⁶		44.68 ²⁶⁸	16.37 ⁶⁴		41.44 ⁴⁴
18.8	46.900 ³¹⁰		30.82 ¹⁷¹	59.202 ⁴²³		47.61 ⁶⁸	40.195 ⁴³³		42.00 ²²⁹	17.01 ⁶⁷		41.00 ⁶
28.8	47.210 ³¹⁷		32.53 ¹⁸⁰	59.625 ⁴³³		48.29 ¹⁰⁷	40.628 ⁴⁵⁶		39.71 ¹⁸²	17.68 ⁶⁹		41.06 ⁵⁵
July 8.8	47.527 ³¹⁷		34.33 ¹⁸⁴	60.058 ⁴³²		49.36 ¹⁴³	41.084 ⁴⁶⁹		37.89 ¹³²	18.37 ⁶⁹		41.61 ¹⁰³
18.7	47.844 ³¹⁰		36.17 ¹⁸⁴	60.490 ⁴²¹		50.79 ¹⁷⁶	41.553 ⁴⁶⁸		36.57 ⁷⁸	19.06 ⁶⁷		42.64 ¹⁴⁸
28.7	48.154 ²⁹⁶		38.01 ¹⁷⁸	60.911 ⁴⁰²		52.55 ²⁰⁵	42.021 ⁴⁵⁵		35.79 ²¹	19.73 ⁶⁵		44.12 ¹⁸⁹
Aug. 7.7	48.450 ²⁷⁵		39.79 ¹⁶⁸	61.313 ³⁷⁵		54.60 ²²⁷	42.476 ⁴²⁵		35.58 ³⁷	20.38 ⁶¹		46.01 ²²⁸
17.7	48.725 ²⁵⁰		41.47 ¹⁵⁵	61.688 ³⁴¹		56.87 ²⁴⁶	42.901 ³⁸⁸		35.95 ⁹³	20.99 ⁵⁶		48.29 ²⁶⁰
27.6	48.975 ²²¹		43.02 ¹³⁹	62.029 ³⁰³		59.33 ²⁵⁹	43.289 ³⁴⁰		36.88 ¹⁴⁶	21.55 ⁴⁸		50.89 ²⁸⁶
Sept. 6.6	49.196 ¹⁹⁰		44.41 ¹¹⁹	62.332 ²⁶⁰		61.92 ²⁶⁶	43.629 ²⁸¹		38.34 ¹⁹⁴	22.03 ⁴³		53.75 ³⁰⁸
16.6	49.386 ¹⁵⁶		45.60 ⁹⁹	62.592 ²¹⁷		64.58 ²⁶⁸	43.910 ²¹⁷		40.28 ²³³	22.46 ³⁵		56.83 ³²²
26.6	49.542 ¹²⁴		46.59 ⁷⁷	62.809 ¹⁷¹		67.26 ²⁶⁶	44.127 ¹⁴⁸		42.61 ²⁶⁷	22.81 ²⁸		60.05 ³³⁰
Oct. 6.5	49.666 ⁹²		47.36 ⁵⁷	62.980 ¹²⁶		69.92 ²⁵⁷	44.275 ⁷⁸		45.28 ²⁸⁸	23.09 ²⁰		63.35 ³³²
16.5	49.758 ⁶⁰		47.93 ³⁷	63.106 ⁷⁹		72.49 ²⁴⁶	44.353 ⁸		48.16 ²⁹⁹	23.29 ¹¹		66.67 ³²⁷
26.5	49.818 ³¹		48.30 ¹⁷	63.185 ³⁵		74.95 ²²⁷	44.361 ⁵⁹		51.15 ²⁹⁸	23.40 ²		69.94 ³¹⁴
Nov. 5.4	49.849 ³		48.47 ¹	63.220 ⁸		77.22 ²⁰⁵	44.302 ¹²³		54.13 ²⁸⁵	23.42 ⁶		73.08 ²⁹³
15.4	49.852 ²³		48.48 ¹⁴	63.212 ⁵²		79.27 ¹⁷⁹	44.179 ¹⁸⁰		56.98 ²⁶¹	23.36 ¹³		76.01 ²⁶⁶
25.4	49.829 ⁴⁷		48.34 ²⁹	63.160 ⁹¹		81.06 ¹⁴⁶	43.999 ²²⁹		59.59 ²²⁷	23.23 ²¹		78.67 ²³²
Dec. 5.4	49.782 ⁷⁰		48.05 ³⁹	63.069 ¹³⁰		82.52 ¹¹⁰	43.770 ²⁷¹		61.86 ¹⁸⁵	23.02 ²⁹		80.99 ¹⁹⁹
15.3	49.712 ⁹⁰		47.66 ⁵⁰	62.939 ¹⁶⁴		83.62 ⁷¹	43.499 ³⁰⁴		63.71 ¹³⁶	22.73 ³⁵		82.88 ¹⁴⁰
25.3	49.622 ¹⁰⁷		47.16 ⁵⁹	62.775 ¹⁹¹		84.33 ²⁹	43.195 ³²⁴		65.07 ⁸²	22.38 ⁴¹		84.28 ⁸⁸
35.3	49.515		46.57	62.584		84.62	42.871		65.89	21.97		85.16
Mean Place	44.927		20.81	57.025		47.57	39.688		71.35	14.815		44.11
Sec δ , Tan δ	1.021		+0.208	1.501		+1.119	1.869		-1.579	2.628		+2.430
$D_{\psi} \alpha$, $D_{\omega} \alpha$	+0.06		-0.01	+0.07		-0.07	+0.04		+0.10	+0.09		-0.15
$D_{\psi} \delta$, $D_{\omega} \delta$	+0.4		+0.4	+0.4		+0.4	+0.4		+0.4	+0.4		+0.4

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Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.	
	Mag. 4.7			Mag. 4.2			Mag. 3.6			Mag. 4.5	
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1 37	+ 5 4	1 38	+50 16	1 40	-16 21	1 41	+ 8 44				
s	"	s	"	s	"	s	"				
n. 0.3	11.194	29.88	32.616	54.82	16.870	68.56	51.48				
10.3	11.084 ¹¹⁰	29.19 ⁶⁹	32.404 ²¹²	54.96 ¹⁴	16.741 ¹²⁹	69.34 ⁷⁸	50.84 ⁶⁴				
20.2	10.962 ¹²²	28.51 ⁶⁸	32.173 ²³¹	54.66 ³⁰	16.601 ¹⁴⁰	69.88 ⁵⁴	50.17 ⁶⁷				
30.2	10.836 ¹²⁶	27.88 ⁶³	31.933 ²⁴⁰	53.93 ⁷³	16.458 ¹⁴³	70.15 ²⁷	49.50 ⁶⁷				
b. 9.2	10.709 ¹²⁷	27.30 ⁵⁸	31.696 ²³⁷	52.78 ¹¹⁵	16.316 ¹⁴²	70.15 ⁰	48.85 ⁶⁵				
	¹¹⁹	⁴⁹	²²¹	¹⁵⁰	¹³⁴	³⁰	⁶⁰				
19.2	10.590 ¹⁰⁶	26.81 ³⁸	31.475 ¹⁹⁵	51.28 ¹⁷⁹	16.182 ¹¹⁸	69.85 ⁵⁸	48.25 ⁵³				
r. 1.1	10.484 ⁸²	26.43 ²³	31.280 ¹⁵⁵	49.49 ²⁰¹	16.064 ⁹⁷	69.27 ⁸⁴	47.72 ⁴¹				
11.1	10.402 ⁵⁶	26.20 ⁷	31.125 ¹⁰⁴	47.48 ²¹⁴	15.967 ⁶⁷	68.43 ¹¹³	47.31 ²⁶				
21.1	10.346 ¹⁹	26.13 ¹³	31.021 ⁴⁵	45.34 ²¹⁸	15.900 ³²	67.30 ¹³⁹	47.05 ⁹				
31.0	10.327 ¹⁹	26.26 ³⁴	30.976 ¹⁹	43.16 ²¹¹	15.868 ⁸	65.91 ¹⁶⁵	46.96 ¹³				
pr. 10.0	10.346	26.60	30.995	41.05	15.876	64.26	47.09				
20.0	10.411 ⁶⁵	27.17 ⁵⁷	31.084 ⁸⁹	39.08 ¹⁹⁷	15.926 ⁵⁰	62.40 ¹⁸⁶	47.44 ³⁵				
30.0	10.518 ¹⁰⁷	27.99 ⁸²	31.239 ¹⁵⁵	37.34 ¹⁷⁴	16.020 ⁹⁴	60.34 ²⁰⁶	48.03 ⁵⁹				
ay 9.9	10.670 ¹⁵²	29.04 ¹⁰⁵	31.461 ²²²	35.89 ¹⁴⁵	16.159 ¹³⁹	58.13 ²²¹	48.86 ⁸³				
19.9	10.861 ¹⁹¹	30.31 ¹²⁷	31.744 ²⁸³	34.80 ¹⁰⁹	16.341 ¹⁸²	55.80 ²³³	49.94 ¹⁰⁸				
	²²⁹	¹⁴⁷	⁸³⁵	⁷⁰	²²⁰	²³⁹	¹²⁹				
29.9	11.090	31.78	32.079	34.10	16.561	53.41	51.23				
ne 8.9	11.352 ²⁶²	33.43 ¹⁶⁵	32.458 ³⁷⁹	33.81 ²⁹	16.813 ²⁵²	51.01 ²⁴⁰	52.71 ¹⁴⁸				
18.8	11.636 ²⁸⁴	35.19 ¹⁷⁶	32.871 ⁴¹³	33.95 ¹⁴	17.091 ²⁷⁸	48.65 ²³⁶	54.35 ¹⁶⁴				
28.8	11.938 ³⁰²	37.03 ¹⁸⁴	33.308 ⁴³⁷	34.50 ⁵⁵	17.388 ²⁹⁷	46.41 ²²⁴	56.10 ¹⁷⁵				
ly 8.8	12.251 ³¹³	38.91 ¹⁸⁸	33.755 ⁴⁴⁷	35.46 ⁹⁶	17.697 ³⁰⁹	44.34 ²⁰⁷	57.91 ¹⁸¹				
	³¹³	¹⁸⁶	⁴⁴⁷	¹³⁴	³¹²	¹⁸⁵	¹⁸³				
18.7	12.564 ³⁰⁵	40.77 ¹⁷⁹	34.202 ⁴³⁸	36.80 ¹⁶⁸	18.009 ³⁰⁵	42.49 ¹⁵⁸	59.74 ¹⁸⁰				
28.7	12.869 ²⁹³	42.56 ¹⁶⁷	34.640 ⁴²⁰	38.48 ¹⁹⁹	18.314 ²⁹⁴	40.91 ¹²⁵	61.54 ¹⁷²				
ug. 7.7	13.162 ²⁷³	44.23 ¹⁵⁰	35.060 ³⁹²	40.47 ²²³	18.608 ²⁷⁴	39.66 ⁹¹					

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Piscium. Mag. 4.8		β Arietis. Mag. 2.7		ψ Phoenicis. Mag. 4.4		ν Ceti. Mag. 4.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 49 s 108 122 130 131 126	° ' " + 2 46 " 72 67 61 53 42	h m 1 50 s 116 130 140 142 137	° ' " +20 24 " 43 58 73 82 90	h m 1 50 s 232 243 247 243 230	° ' " -46 41 " 81 80 22 72 119	h m 1 56 s 133 145 153 154 149	° ' " -21 27 " 95 64 31 0 33
Jan. 0.3	20.045	65.25	7.993	39.26	22.870	84.14	9.928	90.91
10.3	19.937	64.53	7.877	38.83	22.638	84.95	9.795	91.86
20.2	19.815	63.86	7.747	38.25	22.395	85.25	9.650	92.50
30.2	19.685	63.25	7.607	37.52	22.148	85.03	9.497	92.81
Feb. 9.2	19.554	62.72	7.465	36.70	21.905	84.31	9.343	92.81
19.2	19.428	62.30	7.328	35.80	21.675	83.12	9.194	92.48
Mar. 1.1	19.315	62.02	7.206	34.87	21.467	81.47	9.058	91.82
11.1	19.222	61.89	7.106	33.95	21.289	79.41	8.943	90.85
21.1	19.157	61.94	7.037	33.10	21.148	77.00	8.855	89.56
31.1	19.126	62.19	7.005	32.37	21.053	74.27	8.802	87.99
Apr. 10.0	19.134	62.66	7.016	31.79	21.010	71.29	8.789	86.17
20.0	19.184	63.36	7.073	31.41	21.021	68.13	8.820	84.11
30.0	19.279	64.28	7.178	31.29	21.090	64.85	8.896	81.86
May 9.9	19.417	65.44	7.331	31.42	21.216	61.51	9.018	79.45
19.9	19.598	66.80	7.528	31.81	21.399	58.19	9.184	76.93
29.9	19.817	68.34	7.765	32.49	21.635	54.97	9.391	74.37
June 8.9	20.068	70.05	8.036	33.42	21.917	51.93	9.635	71.82
18.8	20.347	71.86	8.333	34.60	22.239	49.13	9.908	69.34
28.8	20.643	73.73	8.651	35.98	22.593	46.66	10.203	66.99
July 8.8	20.951	75.61	8.978	37.53	22.966	44.58	10.514	64.86
18.8	21.261	77.45	9.308	39.22	23.351	42.94	10.830	62.97
28.7	21.567	79.21	9.634	40.99	23.738	41.79	11.146	61.40
Aug. 7.7	21.862	80.81	9.947	42.79	24.116	41.16	11.452	60.19
17.7	22.140	82.25	10.241	44.58	24.474	41.07	11.743	59.37
27.6	22.394	83.47	10.512	46.32	24.804	41.53	12.011	58.95
Sept. 6.6	22.623	84.45	10.755	47.96	25.098	42.51	12.253	58.94
16.6	22.822	85.18	10.968	49.49	25.348	43.99	12.462	59.35
26.6	22.990	85.66	11.150	50.87	25.551	45.89	12.638	60.14
Oct. 6.5	23.126	85.88	11.298	52.08	25.703	48.16	12.779	61.26
16.5	23.231	85.87	11.414	53.13	25.802	50.71	12.883	62.66
26.5	23.304	85.65	11.497	54.00	25.848	53.42	12.952	64.29
Nov. 5.5	23.349	85.27	11.551	54.68	25.844	56.20	12.987	66.06
15.4	23.365	84.74	11.574	55.19	25.791	58.93	12.990	67.89
25.4	23.353	84.10	11.568	55.52	25.693	61.50	12.962	69.71
Dec. 5.4	23.316	83.39	11.533	55.67	25.556	63.83	12.906	71.45
15.3	23.255	82.64	11.472	55.65	25.384	65.82	12.824	73.04
25.3	23.173	81.87	11.386	55.45	25.182	67.41	12.719	74.42
35.3	23.072	81.12	11.279	55.10	24.959	68.53	12.593	75.55
Mean Place	18.526	59.58	6.366	27.71	21.405	75.20	8.444	88.61
Sec δ , Tan δ	1.001	+0.049	1.067	+0.372	1.458	-1.061	1.075	-0.393
$D_{\star} \alpha$, $D_{\star} \alpha$	+0.06	0.00	+0.07	-0.02	+0.05	+0.06	+0.06	+0.02
$D_{\star} \delta$, $D_{\star} \delta$	+0.4	+0.5	+0.4	+0.5	+0.4	+0.5	+0.3	+0.5

FOR THE UPPER TRANSIT AT

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FOR THE UPPER TRANSIT AT WASHINGTON.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Ceti. (Mira.) Var. 1.7-9.6		♋ Fornacis. Mag. 5.4		♊ Hydr. Mag. 4.3		♑ Cassiopeiæ. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
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Jan. 0.3	13.812	54.19	48.989	82.07	19.08	68.10	20.74	26.64
10.3	13.708 ¹⁰⁴	55.05 ⁸⁶	48.856 ¹³³	83.19 ¹¹²	18.53 ⁵⁵	69.01 ⁹¹	20.37 ³⁷	27.71 ¹⁰⁷
20.3	13.586 ¹²²	55.78 ⁷³	48.706 ¹⁵⁰	83.98 ⁷⁹	17.96 ⁵⁷	69.34 ³³	19.95 ⁴²	28.25 ⁵⁴
30.2	13.452 ¹³⁴	56.38 ⁶⁰	48.543 ¹⁶³	84.42 ⁴⁴	17.37 ⁵⁹	69.06 ²⁸	19.51 ⁴⁴	28.23 ²
Feb. 9.2	13.312 ¹⁴⁰	56.82 ⁴⁴	48.375 ¹⁶⁸	84.50 ⁸	16.78 ⁵⁹	68.19 ⁸⁷	19.05 ⁴⁶	27.68 ⁵⁵
19.2	13.173 ¹³⁹	57.09 ²⁷	48.210 ¹⁶⁵	84.22 ²⁸	16.22 ⁵⁶	66.76 ¹⁴³	18.60 ⁴⁵	26.61 ¹⁰⁷
Mar. 1.2	13.043 ¹³⁰	57.18 ⁹	48.054 ¹⁵⁶	83.59 ⁶³	15.70 ⁵²	64.82 ¹⁹⁴	18.20 ⁴⁰	25.07 ¹⁵⁴
11.1	12.930 ¹¹³	57.06 ¹²	47.916 ¹³⁸	82.62 ⁹⁷	15.22 ⁴⁸	62.42 ²⁴⁰	17.84 ³⁶	23.12 ¹⁹⁵
21.1	12.840 ⁹⁰	56.73 ³³	47.803 ¹¹³	81.31 ¹³¹	14.82 ⁴⁰	59.63 ²⁷⁹	17.55 ²⁹	20.85 ²²⁷
31.1	12.783 ⁵⁷	56.19 ⁵⁴	47.724 ⁷⁹	79.70 ¹⁶¹	14.49 ⁸³	56.50 ³¹³	17.34 ²¹	18.36 ²⁴⁹
Apr. 10.0	12.763 ²⁰	55.40 ⁷⁹	47.684 ⁴⁰	77.83 ¹⁸⁷	14.25 ²⁴	53.12 ³³⁸	17.24 ¹⁰	15.73 ²⁶³
20.0	12.785 ²²	54.40 ¹⁰⁰	47.687 ³	75.69 ²¹⁴	14.11 ¹⁴	49.55 ³⁵⁷	17.25 ¹	13.09 ²⁶⁴
30.0	12.851 ⁶⁶	53.17 ¹²³	47.736 ⁴⁹	73.35 ²³⁴	14.07 ⁴	45.88 ³⁶⁷	17.38 ¹³	10.55 ²⁵⁴
May 10.0	12.962 ¹¹¹	51.74 ¹⁴³	47.833 ⁹⁷	70.85 ²⁵⁰	14.13 ⁶	42.19 ³⁶⁹	17.60 ²²	8.17 ²³⁸
19.9	13.116 ¹⁵⁴	50.11 ¹⁶³	47.976 ¹⁴³	68.23 ²⁶²	14.30 ¹⁷	38.55 ³⁶⁴	17.93 ³³	6.06 ²¹¹
29.9	13.311 ¹⁹⁵	48.34 ¹⁷⁷	48.162 ¹⁸⁶	65.56 ²⁶⁷	14.56 ²⁶	35.07 ³⁴⁸	18.35 ⁴²	4.28 ¹⁷⁸
June 8.9	13.540 ²²⁹	46.46 ¹⁸⁸	48.388 ²²⁶	62.91 ²⁶⁵	14.93 ⁸⁷	31.80 ³²⁷	18.85 ⁵⁰	2.87 ¹⁴¹
18.9	13.800 ²⁶⁰	44.51 ¹⁹⁵	48.648 ²⁶⁰	60.33 ²⁵⁸	15.37 ⁴⁴	28.84 ²⁹⁶	19.43 ⁵⁸	1.90 ⁹⁷
28.8	14.082 ²⁸²	42.54 ¹⁹⁷	48.933 ²⁸⁵	57.89 ²⁴⁴	15.88 ⁵¹	26.26 ²⁵⁸	20.06 ⁶³	1.38 ⁵²
July 8.8	14.379 ²⁹⁷	40.60 ¹⁹⁴	49.238 ³⁰⁵	55.65 ²²⁴	16.46 ⁵⁸	24.13 ²¹³	20.72 ⁶⁶	1.32 ⁶
18.8	14.685 ³⁰⁶	38.75 ¹⁸⁵	49.554 ³¹⁶	53.68 ¹⁹⁷	17.07 ⁶¹	22.51 ¹⁶²	21.40 ⁶⁸	1.73 ⁴¹
28.7	14.990 ³⁰⁵	37.05 ¹⁷⁰	49.873 ³¹⁹	52.04 ¹⁶⁴	17.71 ⁶⁴	21.44 ¹⁰⁷	22.08 ⁶⁸	2.59 ⁸⁶
Aug. 7.7	15.289 ²⁹⁹	35.54 ¹⁵¹	50.187 ³¹⁴	50.78 ¹²⁶	18.35 ⁶⁴	20.96 ⁴⁸	22.75 ⁶⁷	3.88 ¹²⁹
17.7	15.575 ²⁸⁶	34.25 ¹²⁹	50.487 ³⁰⁰	49.92 ⁸⁶	18.98 ⁶³	21.09 ¹³	23.41 ⁶⁶	5.56 ¹⁶⁸
27.7	15.841 ²⁶⁶	33.23 ¹⁰²	50.770 ²⁸³	49.50 ⁴²	19.57 ⁵⁹	21.82 ⁷³	24.03 ⁶²	7.60 ²⁰⁴
Sept. 6.6	16.086 ²⁴⁵	32.51 ⁷²	51.028 ²⁵⁸	49.51 ¹	20.12 ⁵⁵	23.14 ¹³²	24.60 ⁵⁷	9.95 ²³⁵
16.6	16.303 ²¹⁷	32.08 ⁴³	51.259 ²³¹	49.96 ⁴⁵	20.59 ⁴⁷	25.00 ¹⁸⁶	25.11 ⁵¹	12.57 ²⁶²
26.6	16.492 ¹⁸⁹	31.96 ¹²	51.456 ¹⁹⁷	50.83 ⁸⁷	20.98 ³⁹	27.35 ²³⁵	25.56 ⁴⁵	15.39 ²⁸²
Oct. 6.6	16.649 ¹⁵⁷	32.13 ¹⁷	51.619 ¹⁶³	52.07 ¹²⁴	21.28 ³⁰	30.09 ²⁷⁴	25.95 ³⁹	18.38 ²⁹⁹
16.5	16.776 ¹²⁷	32.54 ⁴¹	51.747 ¹²⁸	53.62 ¹⁵⁵	21.48 ²⁰	33.14 ³⁰⁵	26.27 ³²	21.47 ³⁰⁹
26.5	16.874 ⁹⁸	33.18 ⁶⁴	51.839 ⁹²	55.42 ¹⁸⁰	21.58 ¹⁰	36.36 ³²²	26.50 ²³	24.58 ³¹¹
Nov. 5.5	16.940 ⁶⁶	34.00 ⁸²	51.896 ⁵⁷	57.37 ¹⁹⁵	21.56 ²	39.65 ³²⁹	26.66 ¹⁶	27.65 ³⁰⁷
15.4	16.976 ³⁶	34.95 ⁹⁵	51.918 ²²	59.42 ²⁰⁵	21.43 ¹³	42.87 ³²²	26.72 ⁶	30.63 ²⁹⁸
25.4	16.984 ⁸	35.98 ¹⁰³	51.906 ¹²	61.46 ²⁰⁴	21.20 ²³	45.90 ³⁰³	26.71 ¹	33.43 ²⁸⁰
Dec. 5.4	16.963 ²¹	37.05 ¹⁰⁷	51.864 ⁴²	63.42 ¹⁹⁶	20.89 ³¹	48.63 ²⁷³	26.61 ¹⁰	35.97 ²⁵⁴
15.4	16.917 ⁴⁶	38.11 ¹⁰⁶	51.792 ⁷²	65.23 ¹⁸¹	20.48 ⁴¹	50.95 ²³²	26.42 ¹⁹	38.19 ²²²
25.3	16.844 ⁷³	39.12 ¹⁰¹	51.693 ⁹⁹	66.81 ¹⁵⁸	20.01 ⁴⁷	52.80 ¹⁸⁵	26.16 ²⁶	40.01 ¹⁸²
35.3	16.749 ⁹⁵	40.05 ⁹³	51.569 ¹²⁴	68.15 ¹³⁴	19.49 ⁵²	54.10 ¹³⁰	25.83 ³³	41.38 ¹³⁷
Place	12.179	57.40	47.391	78.89	17.076	56.06	17.416	4.82
δ, Tan δ	1.002	-0.058	1.096	-0.449	2.794	-2.609	2.563	+2.360
D _α	+0.06	0.00	+0.05	+0.02	+0.02	+0.14	+0.10	-0.13
D _δ	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ ² Ceti. Mag. 4.3		σ Ceti. Mag. 4.8		36 H. Cassiopeiae. Mag. 5.3		γ Ceti. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 23 s	° ' " + 8 5 "	h m 2 28 s	° ' " -15 35 "	h m 2 30 s	° ' " +72 27 "	h m 2 31 s	° ' " + 5 14 "
Jan. 0.3	49.547	42.12	13.617	74.32	16.46	60.69	35.878	15.77
10.3	49.449 98	41.49 63	13.502 115	75.40 108	15.97 49	62.01 132	35.783 95	15.08 69
20.3	49.330 119	40.86 63	13.369 133	76.25 85	15.41 56	62.79 78	35.666 117	14.41 67
30.2	49.197 133	40.24 62	13.222 147	76.82 57	14.81 60	62.99 20	35.534 132	13.79 62
Feb. 9.2	49.056 141	39.65 59	13.067 155	77.10 28	14.20 61	62.61 38	35.393 141	13.23 56
	142	53	155	1	61	95	144	47
19.2	48.914	39.12	12.912	77.11	13.59	61.66	35.249	12.76
Mar. 1.2	48.780 134	38.66 46	12.764 148	76.81 30	13.03 56	60.19 147	35.111 138	12.39 37
11.1	48.662 118	38.30 36	12.631 133	76.22 59	12.52 51	58.28 191	34.989 122	12.16 23
21.1	48.568 94	38.09 21	12.522 109	75.36 86	12.11 41	55.99 229	34.889 100	12.07 9
31.1	48.507 61	38.03 6	12.444 78	74.20 116	11.82 29	53.42 257	34.820 69	12.15 8
	24	11	41	141	16	272	32	28
Apr. 10.1	48.483	38.14	12.403	72.79	11.66	50.70	34.788	12.43
20.0	48.502 19	38.47 33	12.403 0	71.12 167	11.62 4	47.91 279	34.798 10	12.91 48
30.0	48.567 65	39.00 53	12.448 45	69.23 189	11.73 11	45.16 275	34.853 55	13.61 70
May 10.0	48.677 110	39.77 77	12.539 91	67.17 206	11.99 26	42.57 259	34.953 100	14.51 90
19.9	48.831 154	40.74 97	12.675 136	64.95 222	12.37 38	40.20 237	35.098 145	15.63 112
	196	119	178	232	51	204	185	130
29.9	49.027	41.93	12.853	62.63	12.88	38.16	35.283	16.93
June 8.9	49.259 232	43.29 136	13.070 217	60.26 237	13.49 61	36.49 167	35.507 224	18.40 145
18.9	49.522 263	44.79 150	13.319 249	57.91 235	14.19 70	35.24 125	35.761 254	19.99 153
28.8	49.807 285	46.41 162	13.593 274	55.62 229	14.96 77	34.44 80	36.040 279	21.67 161
July 8.8	50.110 303	48.09 168	13.886 293	53.48 214	15.78 82	34.12 32	36.336 296	23.39 175
	310	170	305	196	85	16	307	175
18.8	50.420	49.79	14.191	51.52	16.63	34.28	36.643	25.11
28.8	50.731 311	51.44 165	14.499 308	49.81 171	17.50 87	34.92 64	36.951 308	26.76 165
Aug. 7.7	51.035 304	53.03 159	14.802 303	48.40 141	18.36 86	36.01 109	37.254 303	28.32 155
17.7	51.328 293	54.49 146	15.095 293	47.34 106	19.19 83	37.53 152	37.547 293	29.73 145
27.7	51.603 275	55.79 130	15.372 277	46.64 70	19.98 79	39.44 191	37.824 277	30.94 125
	253	111	255	31	73	227	255	105
Sept. 6.6	51.856	56.90	15.627	46.33	20.71	41.71	38.079	31.95
16.6	52.084 228	57.80 90	15.856 229	46.41 8	21.39 68	44.30 259	38.311 232	32.71 75
26.6	52.284 200	58.47 67	16.056 200	46.86 45	21.99 60	47.13 283	38.515 204	33.24 55
Oct. 6.6	52.455 171	58.93 46	16.224 168	47.67 81	22.50 51	50.17 304	38.691 176	33.52 25
16.5	52.598 143	59.16 23	16.362 138	48.78 111	22.92 42	53.35 318	38.839 148	33.58 25
	111	4	104	135	32	325	117	1
26.5	52.709	59.20	16.466	50.13	23.24	56.60	38.956	33.42
Nov. 5.5	52.790 81	59.07 13	16.537 71	51.67 154	23.45 21	59.86 326	39.045 89	33.09 35
15.5	52.843 53	58.78 29	16.578 41	53.33 166	23.55 10	63.04 318	39.103 58	32.62 45
25.4	52.866 23	58.38 40	16.586 8	55.03 170	23.53 2	66.07 303	39.131 28	32.03 55
Dec. 5.4	52.860 6	57.88 50	16.563 23	56.69 166	23.40 13	68.87 280	39.130 1	31.37 65
	35	57	51	158	25	248	30	75
15.4	52.825	57.31	16.512	58.27	23.15	71.35	39.100	30.65
25.3	52.762 63	56.70 61	16.433 79	59.71 144	22.80 35	73.44 209	39.042 58	29.91 75
35.3	52.675 87	56.06 64	16.330 103	60.95 124	22.36 44	75.06 162	38.958 84	29.18 75
Mean Place	47.804	35.41	11.958	73.56	12.271	38.61	34.112	10.16
Sec δ, Tan δ	1.010	+0.142	1.038	-0.279	3.319	+3.165	1.004	+0.092
D _α α, D _α α	+0.06	-0.01	+0.06	+0.01	+0.11	-0.17	+0.06	-0.01
D _δ δ, D _δ δ	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Hydri. Mag. 5.3		ν Arietis. Mag. 5.4		δ Ceti. Mag. 4.0		ε Hydri. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 33 s	° ' " -79 27 "	h m 2 34 s	° ' " +21 36 "	h m 2 35 s	° ' " - 0 1 "	h m 2 38 s	° ' " -68 36 "
n. 0.3	25.46	74.86 92	11.331	37.53 27	18.436	24.22 84	21.56	76.93 119
10.3	24.28 118	75.78 82	11.231 100	37.26 27	18.340 96	25.06 84	21.03 53	78.12 119
20.3	23.05 123	76.10 —	11.106 125	36.87 39	18.222 118	25.80 74	20.47 56	78.72 60
30.2	21.79 126	75.82 28	10.964 142	36.34 53	18.089 133	26.43 63	19.88 59	78.72 0
ab. 9.2	20.54 125	74.95 87	10.811 153	35.70 64	17.946 143	26.94 51	19.30 58	78.13 59
	121	144	156	74	146	87	58	116
19.2	19.33	73.51	10.655	34.96	17.800	27.31 21	18.72	76.97
ar. 1.2	18.19 114	71.55 196	10.505 150	34.17 79	17.660 140	27.52 4	18.18 54	75.28 109
11.1	17.15 104	69.15 240	10.372 133	33.35 82	17.534 126	27.56 —	17.68 50	73.11 217
21.1	16.24 91	66.35 280	10.265 107	32.54 81	17.430 104	27.41 15	17.24 44	70.52 259
31.1	15.47 77	63.22 313	10.191 74	31.81 73	17.357 73	27.07 34	16.88 36	67.56 296
	60	338	33	63	37	56	29	324
or. 10.1	14.87	59.84	10.158	31.18	17.320	26.51	16.59	64.32
20.0	14.45 42	56.27 357	10.170 12	30.69 49	17.325 5	25.73 78	16.41 18	60.85 347
30.0	14.22 23	52.61 366	10.231 61	30.40 29	17.373 48	24.73 100	16.32 9	57.24 361
ay 10.0	14.18 — 4	48.94 367	10.342 111	30.33 7	17.467 94	23.52 121	16.33 1	53.57 367
19.9	14.34 16	45.33 361	10.500 158	30.49 16	17.604 137	22.12 140	16.45 12	49.92 365
	35	346	202	40	180	158	22	352
29.9	14.69	41.87	10.702	30.89	17.784	20.54	16.67	46.40
ne 8.9	15.24 55	38.63 324	10.943 241	31.55 66	18.001 217	18.84 170	16.98 31	43.03 337
18.9	15.94 70	35.71 292	11.217 274	32.41 86	18.250 249	17.04 180	17.38 40	39.95 308
28.8	16.79 85	33.17 254	11.518 301	33.48 107	18.524 274	15.19 185	17.86 48	37.22 273
ly 8.8	17.76 97	31.07 210	11.836 318	34.74 126	18.815 291	13.35 184	18.39 53	34.91 231
	108	159	327	139	303	180	59	183
18.8	18.84	29.48	12.163	36.13	19.118	11.55	18.98	33.08
28.8	19.98 114	28.45 103	12.493 330	37.62 149	19.423 305	9.88 167	19.60 62	31.80 128
ug. 7.7	21.15 117	28.02 43	12.818 325	39.16 154	19.724 301	8.35 153	20.23 63	31.10 70
17.7	22.31 116	28.19 17	13.132 314	40.72 156	20.015 291	7.02 133	20.85 62	31.00 10
27.7	23.42 111	28.96 77	13.428 296	42.25 153	20.291 276	5.93 109	21.45 60	31.53 53
	104	137	276	146	255	84	56	112
pt. 6.6	24.46	30.33	13.704	43.71	20.546	5.09	22.01	32.65
16.6	25.38 92	32.23 190	13.953 249	45.09 138	20.778 232	4.55 54	22.51 50	34.34 169
26.6	26.15 77	34.62 239	14.176 223	46.34 125	20.983 205	4.27 28	22.94 43	36.54 220
t. 6.6	26.74 59	37.40 278	14.371 195	47.45 111	21.161 178	4.27 0	23.28 34	39.18 264
16.5	27.13 39	40.50 310	14.535 164	48.43 98	21.308 147	4.52 25	23.51 23	42.16 298
	17	327	134	83	119	47	14	320
26.5	27.30 —	43.77	14.669	49.26	21.427	4.99	23.65	45.36
iv. 5.5	27.25 5	47.10 333	14.770 101	49.93 67	21.516 89	5.66 67	23.68 3	48.68 332
15.5	26.98 27	50.36 326	14.840 70	50.46 53	21.574 58	6.46 80	23.61 7	51.98 330
25.4	26.50 48	53.43 307	14.878 38	50.84 38	21.602 28	7.35 89	23.43 18	55.13 315
ac. 5.4	25.81 69	56.21 278	14.884 6	51.07 23	21.602 0	8.30 95	23.15 28	58.03 290
	85	235	27	10	31	96	36	253
15.4	24.96	58.56	14.857	51.17	21.571	9.26	22.79	60.56
25.3	23.96 100	60.42 186	14.799 58	51.13 4	21.513 58	10.20 94	22.36 43	62.63 207
35.3	22.84 112	61.73 131	14.712 87	50.94 19	21.429 84	11.09 89	21.86 50	64.18 155
Place	22.374	62.43	9.410	26.95	16.680	28.13	19.377	65.29
, Tan δ	5.469	-5.377	1.076	+0.396	1.000	0.000	2.743	-2.553
D. α	-0.03	+0.28	+0.07	-0.02	+0.06	0.09	+0.02	+0.18
D. δ	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	τ^2 Eridani. Mag. 4.8		τ Persei. Mag. 4.1		η Eridani. Mag. 4.0		ϵ Arietis (mean). Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 47 s	° ' " -21 20 "	h m 2 48 s	° ' " +52 25 "	h m 2 52 s	° ' " - 9 13 "	h m 2 54 s	° ' " +21 0 "
Jan. 0.3	20.797	31.18 128	28.773	58.05 85	27.058	24.82 110	33.196	56.79 23
10.3	20.678 119	32.46 99	28.594 179	58.90 46	26.961 97	25.92 110	33.107 89	56.56 23
20.3	20.537 141	33.45 66	28.375 219	59.36 2	26.841 120	26.83 91	32.989 118	56.22 34
30.3	20.378 159	34.11 32	28.126 249	59.38 —	26.702 139	27.53 70	32.850 139	55.77 45
Feb. 9.2	20.209 169 172	34.43 — 1	27.859 267 271	58.97 41 81	26.550 152 156	28.01 48 23	32.697 153 160	55.22 55 64
19.2	20.037	34.42	27.588	58.16	26.394	28.24	32.537	54.58
Mar. 1.2	19.870 167	34.05 87	27.327 261	56.97 119	26.241 153	28.24 0	32.380 157	53.88 70
11.2	19.715 155	33.34 71	27.090 237	55.46 151	26.099 142	27.99 25	32.235 145	53.15 73
21.1	19.581 134	32.30 104	26.893 197	53.70 176	25.978 121	27.49 50	32.113 122	52.44 71
31.1	19.479 102 66	30.97 133 164	26.749 144 85	51.76 194 204	25.884 94 58	26.73 76 101	32.022 91 52	51.76 68 58
Apr. 10.1	19.413	29.33	26.664	49.72	25.826	25.72	31.970	51.18
20.0	19.388 — 21	27.44 189 214	26.647 — 57	47.67 205 198	25.808 — 26	24.47 125 147	31.962 — 39	50.73 45 28
30.0	19.409 68	25.30 231	26.704 129	45.69 182	25.834 72	23.00 168	32.001 89	50.45 10
May 10.0	19.477 114 159	22.99 247 254	26.833 199 266	43.87 160 183	25.906 116 160	21.32 185 199	32.090 138 183	50.35 13 35
29.9	19.750	17.98	27.298	40.94	26.182	17.48	32.411	50.83
June 8.9	19.951 201	15.40 258	27.622 324	39.94 100	26.381 199	15.39 209	32.635 224	51.39 56
18.9	20.186 235	12.85 255	27.996 374	39.29 65	26.613 232	13.26 213	32.894 259	52.18 79
28.9	20.451 265	10.40 245	28.409 413	39.01 28	26.874 261	11.16 210	33.181 287	53.15 97
July 8.8	20.738 287 304	8.12 228 205	28.852 443 461	39.10 9 44	27.155 281 295	9.12 204 191	33.490 309 321	54.30 115 127
18.8	21.042	6.07	29.313	39.54	27.450	7.21	33.811	55.57
28.8	21.352 310	4.31 176	29.782 469	40.35 81	27.752 302	5.49 172	34.138 327	56.93 134
Aug. 7.7	21.662 310	2.88 143	30.249 467	41.49 114	28.054 302	3.99 150	34.463 325	58.35 145
17.7	21.964 302	1.85 103	30.705 456	42.92 143	28.349 295	2.79 120	34.781 318	59.77 145
27.7	22.253 289 270	1.23 62 18	31.141 436 411	44.62 170 191	28.631 282 263	1.90 89 55	35.084 303 287	61.17 144 13
Sept. 6.7	22.523	1.05 —	31.552	46.53	28.894	1.35	35.371	62.51
16.6	22.768 245	1.30 25	31.931 379	48.64 211	29.137 243	1.16 19	35.634 263	63.76 124
26.6	22.986 218	1.97 67	32.274 343	50.88 224	29.354 217	1.32 16	35.873 239	64.88 115
Oct. 6.6	23.175 189	3.03 106	32.577 303	53.22 234	29.544 190	1.80 48	36.085 212	65.88 104
16.6	23.330 155 122	4.42 139 168	32.837 260 213	55.62 240 241	29.705 161 130	2.59 79 103	36.269 184 154	66.74 84 77
26.5	23.452	6.10	33.050	58.03	29.835	3.62	36.423	67.46
Nov. 5.5	23.541 89	7.97 187	33.215 165	60.40 237	29.936 101	4.86 124	36.546 123	68.04 58
15.5	23.596 55	9.96 199	33.328 113	62.69 229	30.006 70	6.24 138	36.638 92	68.49 45
25.4	23.616 20	12.00 204	33.387 59	64.83 214	30.044 38	7.70 146	36.697 59	68.81 32
Dec. 5.4	23.602 14 45	14.00 200 189	33.392 — 51	66.80 197 171	30.050 6 25	9.18 148 143	36.722 25 9	69.00 19 8
15.4	23.557	15.89	33.341	68.51	30.025	10.61	36.713	69.08
25.4	23.480 77	17.59 170	33.237 104	69.93 142	29.971 54	11.96 135	36.672 41	69.04 4
35.3	23.374 106	19.06 147	33.082 155	71.00 107	29.887 84	13.16 120	36.597 75	68.88 16
Mean Place	19.053	28.69	26.049	40.31	25.260	25.68	31.161	47.17
Sec δ , Tan δ	1.074	-0.391	1.640	+1.300	1.013	-0.162	1.071	+0.384
$D\alpha, D_{\alpha} \alpha$	+0.05	+0.02	+0.08	-0.06	+0.06	+0.01	+0.07	-0.02
$D\delta, D_{\delta} \delta$	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Persel. Mag. 3.1		ρ Persel. Var. 3.4-4.2		μ Horologi. Mag. 5.2		θ Hydri. Mag. 5.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 58 s	° ' " +53 11 "	h m 2 59 s	° ' " +38 31 "	h m 3 1 s	° ' " -60 2 "	h m 3 2 s	° ' " -72 12 "
Jan. 0.3	53.728	28.23	57.327	37.99	42.68	89.07	7.07	92.96
10.3	53.554 174	29.20 97	57.214 113	38.42 43	42.35 33	90.67 100	6.44 63	94.44 148
20.3	53.337 217	29.77 57	57.067 147	38.57 15	41.97 38	91.73 106	5.75 69	95.33 89
30.3	53.086 251	29.91 14	56.892 175	38.42 15	41.57 40	92.22 49	5.03 72	95.64 31
Feb. 9.2	52.814 272	29.63 28	56.699 193	38.00 42	41.15 42	92.12 10	4.30 73	95.35 29
19.2	52.534 280	28.93 70	56.498 201	37.29 71	40.74 41	91.47 65	3.56 74	94.48 87
Mar. 1.2	52.261 273	27.84 109	56.301 197	36.35 94	40.34 40	90.28 119	2.86 70	93.05 143
11.2	52.012 249	26.42 142	56.119 182	35.19 116	39.96 38	88.58 170	2.21 65	91.13 192
21.1	51.799 213	24.71 171	55.965 154	33.89 130	39.62 34	86.43 215	1.61 60	88.77 236
31.1	51.637 162	22.81 190	55.848 117	32.49 140	39.33 29	83.87 256	1.09 52	86.01 276
Apr. 10.1	51.537 100	20.79 202	55.778 70	31.07 142	39.10 23	80.96 291	0.67 42	82.92 309
20.0	51.504 33	18.73 206	55.760 18	29.68 139	38.94 16	77.78 318	0.35 32	79.58 334
30.0	51.544 40	16.72 201	55.799 39	28.39 129	38.85 9	74.39 339	0.16 19	76.06 352
May 10.0	51.658 114	14.84 188	55.897 98	27.28 111	38.84 1	70.86 353	0.07 9	72.43 363
20.0	51.846 188	13.16 168	56.052 155	26.36 92	38.91 7	67.28 358	0.11 4	68.79 364
29.9	52.100 254	11.72 144	56.260 208	25.70 66	39.05 14	63.74 354	0.27 16	65.22 357
June 8.9	52.416 316	10.61 111	56.516 256	25.30 40	39.27 22	60.30 344	0.56 29	61.80 342
18.9	52.785 369	9.83 78	56.814 298	25.18 12	39.56 29	57.07 323	0.95 39	58.61 319
28.9	53.196 411	9.39 44	57.144 330	25.37 19	39.90 34	54.12 295	1.44 49	55.74 287
July 8.8	53.639 443	9.34 5	57.501 357	25.83 46	40.30 40	51.53 259	2.01 57	53.26 248
18.8	54.103 464	9.65 31	57.873 372	26.57 74	40.74 44	49.38 215	2.65 64	51.24 202
28.8	54.577 474	10.31 66	58.252 379	27.54 97	41.20 46	47.72 166	3.35 70	49.75 149
Aug. 7.7	55.053 476	11.30 99	58.632 380	28.73 119	41.68 48	46.62 110	4.07 72	48.84 91
17.7	55.521 468	12.60 130	59.004 372	30.10 137	42.16 48	46.11 51	4.80 73	48.51 33
27.7	55.971 450	14.17 157	59.361 357	31.60 150	42.63 47	46.21 10	5.52 72	48.81 30
Sept. 6.7	56.398 427	15.97 180	59.700 339	33.23 163	43.08 45	46.91 70	6.20 68	49.74 93
16.6	56.794 396	17.97 200	60.014 314	34.92 169	43.48 40	48.21 130	6.83 63	51.25 151
26.6	57.155 361	20.14 217	60.301 287	36.64 172	43.84 36	50.06 185	7.38 55	53.30 205
Oct. 6.6	57.478 323	22.42 228	60.557 256	38.37 173	44.15 31	52.39 233	7.83 45	55.83 253
16.6	57.759 281	24.77 235	60.781 224	40.09 172	44.38 23	55.13 274	8.17 34	58.74 291
26.5	57.993 284	27.15 238	60.971 190	41.76 167	44.55 17	58.18 305	8.39 22	61.92 318
Nov. 5.5	58.176 183	29.52 237	61.123 152	43.34 158	44.64 9	61.41 323	8.49 10	65.27 335
15.5	58.308 132	31.82 230	61.236 113	44.84 150	44.65 1	64.71 330	8.45 4	68.66 339
25.4	58.385 77	34.01 219	61.310 74	46.22 138	44.59 6	67.95 324	8.27 18	71.95 329
Dec. 5.4	58.406 21	36.02 201	61.341 81	47.43 121	44.46 13	71.01 306	7.99 28	75.02 307
15.4	58.369 37	37.82 180	61.330 11	48.47 104	44.27 19	73.80 279	7.59 40	77.77 275
25.4	58.275 94	39.33 151	61.277 53	49.29 82	44.01 26	76.19 239	7.08 51	80.10 233
35.3	58.127 148	40.50 117	61.183 94	49.86 57	43.70 31	78.12 193	6.50 58	81.93 183
Mean Place	50.866	10.99	54.953	24.01	40.585	78.86	4.426	81.63
Sec δ , Tan δ	1.669	+1.336	1.278	+0.796	2.003	-1.736	3.275	-3.118
$D_{\mu} a$, $D_{\mu} a$	+0.09	-0.06	+0.08	-0.04	+0.03	+0.08	0.00	+0.15
δ , $D_{\mu} \delta$	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Persel. (Algol.) Var. 2.1-3.2			δ Arietis. Mag. 4.5			12 Eridani. Mag. 4.0			48 H. Cephei. Mag. 5.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	'	h	m	'	h	m	'	h	m	'
	3	2	+40 38	3	6	+19 25	3	8	-29 18	3	9	+77 26
	s		"	s		"	s		"	s		"
Jan. 0.4	52.067		40.74	58.302		11.61	37.045		39.69	58.44		26.78
10.3	51.950 ¹¹⁷		41.27 ⁵³	58.220 ⁸²		11.35 ²⁶	36.916 ¹²⁹		41.23 ¹⁵⁴	57.83 ⁶¹		28.67 ¹⁸⁹
20.3	51.796 ¹⁵⁴		41.50 ²³	58.109 ¹¹¹		11.01 ³⁴	36.760 ¹⁵⁶		42.42 ¹¹⁹	57.10 ⁷³		30.03 ¹³⁶
30.3	51.615 ¹⁸¹		41.43 ⁷	57.974 ¹³⁵		10.58 ⁴³	36.584 ¹⁷⁶		43.21 ⁷⁹	56.28 ⁸²		30.84 ⁸¹
Feb. 9.2	51.414 ²⁰¹		41.05 ³⁸	57.822 ¹⁵²		10.07 ⁵¹	36.392 ¹⁹²		43.59 ³⁸	55.41 ⁸⁷		31.06 ²²
	209		68	160		58	198		2	89		38
19.2	51.205		40.37	57.662		9.49	36.194		43.57	54.52		30.68
Mar. 1.2	50.999 ²⁰⁶		39.43 ⁹⁴	57.502 ¹⁶⁰		8.86 ⁶³	35.998 ¹⁹⁶		43.13 ⁴⁴	53.65 ⁸⁷		29.71 ⁹⁷
11.2	50.808 ¹⁹¹		38.25 ¹¹⁸	57.352 ¹⁵⁰		8.22 ⁶⁴	35.812 ¹⁸⁶		42.29 ⁸⁴	52.84 ⁸¹		28.22 ¹⁴⁹
21.1	50.645 ¹⁶³		36.90 ¹³⁵	57.223 ¹²⁹		7.59 ⁶³	35.648 ¹⁶⁴		41.07 ¹²²	52.14 ⁷⁰		26.26 ¹⁹⁶
31.1	50.521 ¹²⁴		35.44 ¹⁴⁶	57.122 ¹⁰¹		7.01 ⁵⁸	35.511 ¹³⁷		39.49 ¹⁵⁸	51.57 ⁵⁷		23.93 ²³³
	77		150	62		49	99		189	39		263
Apr. 10.1	50.444		33.94	57.060		6.52	35.412		37.60	51.18		21.30
20.1	50.421 ²³		32.46 ¹⁴⁸	57.041 ¹⁹		6.15 ³⁷	35.354 ⁵⁸		35.40 ²²⁰	50.95 ²³		18.50 ²³⁰
30.0	50.456 ³⁵		31.06 ¹⁴⁰	57.068 ²⁷		5.95 ²⁰	35.343 ¹¹		32.97 ²⁴³	50.92 ³		15.63 ²⁸⁷
May 10.0	50.552 ⁹⁶		29.82 ¹²⁴	57.144 ⁷⁶		5.92 ³	35.381 ³⁸		30.33 ²⁶⁴	51.07 ¹⁵		12.78 ²⁸⁵
20.0	50.706 ¹⁵⁴		28.78 ¹⁰⁴	57.268 ¹²⁴		6.11 ¹⁹	35.469 ⁸⁸		27.56 ²⁷⁷	51.41 ³⁴		10.07 ²⁷¹
	210		79	171		39	136		286	53		249
29.9	50.916		27.99	57.439		6.50	35.605		24.70	51.94		7.58
June 8.9	51.175 ²⁵⁹		27.46 ⁵³	57.651 ²¹²		7.10 ⁶⁰	35.785 ¹⁸⁰		21.82 ²⁸⁸	52.62 ⁶⁸		5.36 ²²²
18.9	51.477 ³⁰²		27.24 ²²	57.899 ²⁴⁸		7.90 ⁸⁰	36.007 ²²²		19.00 ²⁸²	53.45 ⁸³		3.51 ¹⁸⁵
28.9	51.815 ³³⁸		27.30 ⁶	58.176 ²⁷⁷		8.87 ⁹⁷	36.263 ²⁵⁶		16.31 ²⁶⁹	54.41 ⁹⁶		2.07 ¹⁴⁴
July 8.8	52.178 ³⁶³		27.67 ³⁷	58.476 ³⁰⁰		10.00 ¹¹³	36.546 ²⁸³		13.83 ²⁴⁸	55.45 ¹⁰⁴		1.07 ¹⁰⁰
	380		64	315		124	304		221	111		53
18.8	52.558		28.31	58.791		11.24	36.850		11.62	56.56		0.54 ⁷
28.8	52.947 ³⁸⁹		29.21 ⁹⁰	59.113 ³²²		12.55 ¹³¹	37.165 ³¹⁵		9.73 ¹⁸⁹	57.72 ¹¹⁶		0.47 [—]
Aug. 7.8	53.336 ³⁸⁹		30.34 ¹¹³	59.435 ³²²		13.90 ¹³⁵	37.486 ³²¹		8.24 ¹⁴⁹	58.90 ¹¹⁸		0.88 ⁴¹
17.7	53.719 ³⁸³		31.67 ¹³³	59.752 ³¹⁷		15.24 ¹³⁴	37.804 ³¹⁸		7.20 ¹⁰⁴	60.08 ¹¹⁸		1.75 ⁸⁷
27.7	54.088 ³⁶⁹		33.16 ¹⁴⁹	60.057 ³⁰⁵		16.55 ¹³¹	38.111 ³⁰⁷		6.62 ⁵⁸	61.23 ¹¹⁵		3.06 ¹³¹
	348		163	290		123	292		8	111		173
Sept. 6.7	54.436		34.79	60.347		17.78	38.403		6.54 [—]	62.34		4.79
16.6	54.761 ³²⁵		36.50 ¹⁷¹	60.616 ²⁶⁹		18.90 ¹¹²	38.674 ²⁷¹		6.96 ⁴²	63.38 ¹⁰⁴		6.89 ²¹⁰
26.6	55.058 ²⁹⁷		38.27 ¹⁷⁷	60.862 ²⁴⁶		19.90 ¹⁰⁰	38.917 ²⁴³		7.85 ⁸⁹	64.34 ⁹⁶		9.32 ²⁴³
Oct. 6.6	55.324 ²⁶⁶		40.07 ¹⁸⁰	61.083 ²²¹		20.77 ⁸⁷	39.130 ²¹³		9.18 ¹³³	65.18 ⁸⁴		12.04 ²⁷²
16.6	55.558 ²³⁴		41.86 ¹⁷⁹	61.277 ¹⁹⁴		21.48 ⁷¹	39.312 ¹⁸²		10.90 ¹⁷²	65.92 ⁷⁴		15.01 ²⁹⁷
	197		177	165		59	145		203	61		313
26.5	55.755		43.63	61.442		22.07	39.457		12.93	66.53		18.14
Nov. 5.5	55.915 ¹⁶⁰		45.33 ¹⁷⁰	61.579 ¹³⁷		22.51 ⁴⁴	39.565 ¹⁰⁸		15.19 ²²⁶	66.98 ⁴⁵		21.38 ³²⁴
15.5	56.035 ¹²⁰		46.94 ¹⁶¹	61.683 ¹⁰⁴		22.83 ³²	39.636 ⁷¹		17.59 ²⁴⁰	67.28 ³⁰		24.66 ³²⁸
25.5	56.113 ⁷⁸		48.44 ¹⁵⁰	61.754 ⁷¹		23.03 ²⁰	39.668 ³²		20.04 ²⁴⁵	67.41 ¹³		27.89 ³²³
Dec. 5.4	56.147 ³⁴		49.78 ¹³⁴	61.793 ³⁹		23.12 ⁹	39.664 ⁴		22.44 ²⁴⁰	67.37 ⁴		30.97 ³⁰⁸
	10		116	3		0	43		227	21		283
15.4	56.137		50.94	61.796		23.12	39.621		24.71	67.16		33.85
25.4	56.083 ⁵⁴		51.88 ⁹⁴	61.765 ³¹		23.01 ¹¹	39.543 ⁷⁸		26.75 ²⁰⁴	66.79 ³⁷		36.41 ²⁵⁶
35.3	55.986 ⁹⁷		52.56 ⁶⁸	61.699 ⁶⁶		22.82 ¹⁹	39.430 ¹¹³		28.50 ¹⁷⁵	66.25 ⁵⁴		38.57 ²¹⁶
Mean Place	43.618		26.42	56.215		2.93	35.202		35.18	51.871		6.92
Sec δ , Tan δ	1.318		+0.858	1.060		+0.353	1.147		-0.561	4.598		+4.488
$D_{\delta} \alpha$, $D_{\alpha} \alpha$	+0.08		-0.04	+0.07		-0.02	+0.05		+0.03	+0.15		-0.20
$D_{\delta} \delta$, $D_{\alpha} \delta$	+0.3		+0.7	+0.3		+0.7	+0.3		+0.7	+0.3		+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Arietis. Mag. 5.0		38 G. Horologii. Mag. 5.7		ζ Eridani. Mag. 4.9		τ Arietis. Mag. 5.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 10 s	° ' " +20 44 "	h m 3 10 s	° ' " -57 37 "	h m 3 11 s	° ' " -9 7 "	h m 3 16 s	° ' " +20 51 "
Jan. 0.4	13.194	37.60	30.406	51.79	52.828	24.05	31.544	16.72
10.3	13.113 81	37.39 21	30.106 300	53.52 173	52.740 88	25.21 116	31.466 78	16.55 15
20.3	13.002 111	37.10 29	29.767 339	54.72 120	52.625 115	26.20 99	31.358 108	16.26 28
30.3	12.867 135	36.70 40	29.403 364	55.36 64	52.488 137	26.96 76	31.225 133	15.89 38
Feb. 9.2	12.714 153	36.21 49	29.021 382	55.44 8	52.335 153	27.51 55	31.072 153	15.42 48
	163	58	384	50	160	30	164	58
19.2	12.551	35.63	28.637	54.94	52.175	27.81	30.908	14.87
Mar. 1.2	12.389 162	35.00 63	28.260 377	53.92 102	52.013 162	27.88 7	30.744 164	14.27 6
11.2	12.236 153	34.33 67	27.906 354	52.38 154	51.861 152	27.69 19	30.588 156	13.62 6
21.1	12.103 133	33.67 66	27.584 322	50.38 200	51.727 134	27.24 45	30.452 136	12.97 6
31.1	12.000 103	33.04 63	27.307 277	47.96 242	51.618 109	26.55 69	30.344 108	12.35 6
	66	56	222	277	75	97	72	5
Apr. 10.1	11.934	32.48	27.085	45.19	51.543	25.58	30.272	11.80
20.1	11.910 24	32.04 44	26.922 163	42.10 309	51.507 36	24.39 119	30.243 29	11.35 4
30.0	11.934 24	31.76 28	26.831 91	38.81 329	51.514 7	22.97 142	30.261 18	11.06 1
May 10.0	12.007 73	31.65 11	26.810 21	35.36 345	51.565 51	21.35 162	30.327 66	10.93 1
20.0	12.129 122	31.73 8	26.865 55	31.82 354	51.664 99	19.53 182	30.443 116	10.99 1
	168	30	127	352	142	194	163	1
29.9	12.297	32.03	26.992	28.30	51.806	17.59	30.606	11.27
June 8.9	12.508 211	32.54 51	27.191 199	24.86 344	51.987 181	15.54 205	30.811 205	11.74 1
18.9	12.755 247	33.26 72	27.454 263	21.60 326	52.204 217	13.44 210	31.054 243	12.42 1
28.9	13.032 277	34.15 89	27.775 321	18.59 301	52.453 249	11.33 211	31.326 272	13.27 1
July 8.8	13.333 301	35.20 105	28.145 370	15.92 267	52.725 272	9.29 204	31.624 296	14.27 1
	315	118	409	225	287	192	314	1
18.8	13.648	36.38	28.554	13.67	53.012	7.37	31.938	15.41
28.8	13.972 324	37.64 126	28.989 435	11.90 177	53.310 298	5.63 174	32.261 323	16.64 1
Aug. 7.8	14.297 325	38.96 132	29.442 453	10.67 123	53.611 301	4.12 151	32.586 325	17.91 1
17.7	14.617 320	40.28 132	29.897 455	10.02 65	53.905 294	2.88 124	32.906 320	19.19 1
27.7	14.925 308	41.58 130	30.341 444	9.98 4	54.191 286	1.96 92	33.216 310	20.45 1
	293	124	425	56	271	58	296	1
Sept. 6.7	15.218	42.82	30.766	10.54	54.462	1.38	33.512	21.64
16.6	15.491 273	43.95 113	31.157 391	11.70 116	54.715 253	1.16 22	33.790 278	22.76 1
26.6	15.741 250	44.98 103	31.506 349	13.42 172	54.946 231	1.30 14	34.044 254	23.76 1
Oct. 6.6	15.967 226	45.89 91	31.804 298	15.64 222	55.151 205	1.78 48	34.276 232	24.65 1
16.6	16.165 198	46.67 78	32.042 238	18.29 265	55.330 179	2.56 78	34.480 204	25.39 1
	169	63	176	297	149	105	175	1
26.5	16.334	47.30	32.218	21.26	55.479	3.61	34.655	26.02
Nov. 5.5	16.475 141	47.82 52	32.325 107	24.46 320	55.598 119	4.87 126	34.803 148	26.52 1
15.5	16.583 106	48.21 39	32.362 37	27.73 327	55.686 88	6.29 142	34.919 116	26.90 1
25.5	16.658 75	48.47 26	32.331 31	30.98 325	55.743 57	7.80 151	35.001 82	27.16 1
Dec. 5.4	16.700 42	48.64 17	32.231 100	34.08 310	55.767 24	9.33 153	35.049 48	27.32 1
	6	6	164	285	8	150	12	1
15.4	16.706	48.70	32.067	36.93	55.759	10.83	35.061	27.39
25.4	16.676 30	48.66 4	31.846 221	39.41 248	55.717 42	12.24 141	35.038 23	27.36 1
35.3	16.612 64	48.52 14	31.573 273	41.47 206	55.645 72	13.52 128	34.977 61	27.24 1
Mean Place	11.074	28.71	28.308	42.09	50.940	24.65	29.388	8.08
Sec δ, Tan δ	1.069	+0.379	1.868	-1.577	1.013	-0.161	1.070	+0.381
D _α , D _α α	+0.07	-0.02	+0.03	+0.07	+0.06	+0.01	+0.07	-0.02
D _δ δ, D _δ δ	+0.8	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α H. Camelop. Mag. 4.4		ξ Tauri. Mag. 3.8		f Tauri. Mag. 4.3		ε Eridani. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 22 s	° ' " +59 39 "	h m 3 22 s	° ' " + 9 26 "	h m 3 26 s	° ' " +12 39 "	h m 3 29 s	° ' " - 9 45 "
Jan. 0.4	28.583	37.59	45.435	56.32	22.721	29.65	5.913	65.88
10.3	28.389 ¹⁹⁴	38.99 ¹⁴⁰	45.364 ⁷¹	55.72 ⁶⁰	22.653 ⁶⁸	29.17 ⁴⁸	5.829 ⁸⁴	67.12 ¹²
20.3	28.138 ²⁵¹	39.97 ⁹⁸	45.264 ¹⁰⁰	55.13 ⁵⁹	22.554 ⁹⁹	28.68 ⁴⁹	5.716 ¹¹³	68.17 ¹⁰
30.3	27.840 ²⁹⁸	40.51 ⁵⁴	45.138 ¹²⁶	54.56 ⁵⁷	22.427 ¹²⁷	28.17 ⁵¹	5.579 ¹³⁷	69.00 ⁸
Feb. 9.3	27.510 ³³⁰	40.58 ⁷	44.994 ¹⁴⁴	54.03 ⁵³	22.282 ¹⁴⁵	27.67 ⁵⁰	5.424 ¹⁵⁵	69.58 ¹
	347	39	155	48	158	49	167	
19.2	27.163	40.19	44.839	53.55	22.124	27.18	5.257	69.92
Mar. 1.2	26.817 ³⁴⁶	39.34 ⁸⁵	44.680 ¹⁵⁹	53.12 ⁴³	21.963 ¹⁶¹	26.71 ⁴⁷	5.088 ¹⁶⁹	70.01 ⁻
11.2	26.492 ³²⁵	38.07 ¹²⁷	44.529 ¹⁵¹	52.77 ³⁵	21.809 ¹⁵⁴	26.29 ⁴²	4.927 ¹⁶¹	69.83
21.1	26.205 ²⁸⁷	36.44 ¹⁶³	44.394 ¹³⁵	52.53 ²⁴	21.671 ¹³⁸	25.93 ³⁶	4.781 ¹⁴⁶	69.40
31.1	25.972 ²³³	34.54 ¹⁹⁰	44.286 ¹⁰⁸	52.40 ¹³	21.559 ¹¹²	25.67 ²⁶	4.660 ¹²¹	68.70
	165	213	76	1	78	14	90	
Apr. 10.1	25.807	32.41	44.210	52.41	21.481	25.53	4.570	67.76
20.1	25.718 ⁸⁹	30.18 ²²³	44.175 ³⁵	52.59 ¹⁸	21.444 ³⁷	25.52 ¹	4.519 ⁵¹	66.56 ¹
30.0	25.714 ⁴	27.92 ²²⁶	44.182 ⁷	52.94 ³⁵	21.450 ⁶	25.69 ¹⁷	4.511 ⁸	65.13 ¹
May 10.0	25.797 ⁸³	25.71 ²²¹	44.237 ⁵⁵	53.47 ⁵³	21.502 ⁵²	26.03 ³⁴	4.548 ³⁷	63.50 ¹
20.0	25.966 ¹⁶⁹	23.65 ²⁰⁶	44.337 ¹⁰⁰	54.20 ⁷³	21.602 ¹⁰⁰	26.56 ⁵³	4.631 ⁸³	61.69 ¹
	250	187	146	91	145	72	127	
30.0	26.216	21.78	44.483	55.11	21.747	27.28	4.758	59.75
June 8.9	26.541 ³²⁵	20.19 ¹⁵⁹	44.669 ¹⁸⁶	56.19 ¹⁰⁸	21.933 ¹⁸⁶	28.17 ⁸⁹	4.926 ¹⁶⁸	57.70 ¹
18.9	26.932 ³⁹¹	18.91 ¹²⁸	44.892 ²²³	57.41 ¹²²	22.157 ²²⁴	29.21 ¹⁰⁴	5.131 ²⁰⁵	55.60 ¹
28.9	27.380 ⁴⁴⁸	17.97 ⁹⁴	45.146 ²⁵⁴	58.75 ¹³⁴	22.412 ²⁵⁵	30.40 ¹¹⁹	5.368 ²³⁷	53.50 ¹
July 8.8	27.871 ⁴⁹¹	17.41 ⁵⁶	45.423 ²⁷⁷	60.15 ¹⁴⁰	22.691 ²⁷⁹	31.67 ¹²⁷	5.630 ²⁶²	51.47 ¹
	523	19	294	145	296	133	280	
18.8	28.394	17.22	45.717	61.60	22.987	33.00	5.910	49.55
28.8	28.938 ⁵⁴⁴	17.42 ²⁰	46.023 ³⁰⁶	63.02 ¹⁴²	23.294 ³⁰⁷	34.35 ¹³⁵	6.202 ²⁹²	47.81
Aug. 7.8	29.491 ⁵⁵³	17.99 ⁵⁷	46.329 ³⁰⁶	64.40 ¹³⁸	23.605 ³¹¹	35.67 ¹³²	6.498 ²⁹⁶	46.31
17.7	30.041 ⁵⁵⁰	18.90 ⁹¹	46.632 ³⁰³	65.67 ¹²⁷	23.912 ³⁰⁷	36.92 ¹²⁵	6.794 ²⁹⁶	45.09
27.7	30.578 ⁵³⁷	20.15 ¹²⁵	46.928 ²⁹⁶	66.80 ¹¹³	24.211 ²⁹⁹	38.05 ¹¹³	7.082 ²⁸⁸	44.19
	519	155	282	96	287	101	275	
Sept. 6.7	31.097	21.70	47.210	67.76	24.498	39.06	7.357	43.64
16.7	31.586 ⁴⁸⁹	23.51 ¹⁸¹	47.475 ²⁶⁵	68.52 ⁷⁶	24.769 ²⁷¹	39.91 ⁸⁵	7.614 ²⁵⁷	43.46
26.6	32.040 ⁴⁵⁴	25.56 ²⁰⁵	47.719 ²⁴⁴	69.09 ⁵⁷	25.019 ²⁵⁰	40.57 ⁶⁶	7.852 ²³⁸	43.64
Oct. 6.6	32.453 ⁴¹³	27.79 ²²³	47.941 ²²²	69.44 ³⁵	25.247 ²²⁸	41.05 ⁴⁸	8.065 ²¹³	44.16
16.6	32.819 ³⁶⁶	30.17 ²³⁸	48.138 ¹⁹⁷	69.57 ¹³	25.450 ²⁰³	41.34 ²⁹	8.254 ¹⁸⁹	45.01
	314	249	170	4	177	12	160	
26.5	33.133	32.66	48.308	69.53	25.627	41.46	8.414	46.14
Nov. 5.5	33.390 ²⁵⁷	35.19 ²⁵³	48.450 ¹⁴²	69.31 ²²	25.776 ¹⁴⁹	41.44 ²	8.545 ¹³¹	47.49
15.5	33.584 ¹⁹⁴	37.73 ²⁵⁴	48.562 ¹¹²	68.97 ³⁴	25.894 ¹¹⁸	41.28 ¹⁶	8.645 ¹⁰⁰	49.00
25.5	33.712 ¹²⁸	40.22 ²⁴⁹	48.643 ⁸¹	68.51 ⁴⁶	25.982 ⁸⁸	41.01 ²⁷	8.712 ⁶⁷	50.60
Dec. 5.4	33.768 ⁵⁶	42.59 ²³⁷	48.692 ⁴⁹	67.98 ⁵³	26.036 ⁵⁴	40.67 ³⁴	8.746 ³⁴	52.23
	15	218	14	58	19	41	1	
15.4	33.753	44.77	48.706	67.40	26.055	40.26	8.747	53.83
25.4	33.664 ⁸⁹	46.70 ¹⁹³	48.686 ²⁰	66.79 ⁶¹	26.038 ¹⁷	39.81 ⁴⁵	8.713 ³⁴	55.33
35.4	33.507 ¹⁵⁷	48.31 ¹⁶¹	48.633 ⁵³	66.18 ⁶¹	25.987 ⁵¹	39.34 ⁴⁷	8.645 ⁶⁸	56.70
Mean Place	25.078	20.86	43.377	50.95	20.614	23.57	3.967	65.91
Sec δ, Tan δ	1.980	+1.709	1.014	+0.166	1.025	+0.225	1.015	-0.172
Dψ α, Dα α	+0.10	-0.07	+0.06	-0.01	+0.06	-0.01	+0.06	+0.01
Dψ δ, Dα δ	+0.3	+0.8	+0.3	+0.8	+0.2	+0.8	+0.2	+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington in Time.	γ Hydr. Mag. 3.2		ζ Persei. Mag. 2.9		θ H. Camelop. Mag. 5.2		ε Persei. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 48	° ' " -74 28	h m 3 48	° ' " +31 38	h m 3 50	° ' " +60 52	h m 3 52	° ' " +39 46
n. 0.4	32.96	95.89	60.922	37.60	11.93	26.56	23.561	37.76
10.4	32.30	97.97	60.858	37.97	11.76	28.21	23.487	38.50
20.3	31.55	99.53	60.754	38.16	11.53	29.49	23.369	39.03
30.3	30.73	100.52	60.616	38.18	11.24	30.35	23.212	39.30
b. 9.3	29.87	100.92	60.450	38.01	10.91	30.75	23.025	39.31
19.2	28.98	100.75	60.266	37.66	10.55	30.69	22.816	39.04
11.2	27.25	98.75	59.886	36.41	9.82	29.21	22.387	37.73
21.2	26.45	96.98	59.715	35.59	9.49	27.84	22.192	36.74
31.1	25.72	94.76	59.570	34.67	9.21	26.13	22.027	35.58
10.1	25.09	92.14	59.461	33.71	9.00	24.17	21.901	34.32
20.1	24.56	89.20	59.396	32.76	8.86	22.01	21.824	33.00
30.1	24.16	85.99	59.382	31.87	8.80	19.77	21.801	31.69
10.0	23.88	82.59	59.420	31.07	8.83	17.51	21.837	30.45
20.0	23.73	79.06	59.512	30.42	8.95	15.32	21.931	29.33
30.0	23.74	75.51	59.656	29.94	9.15	13.29	22.082	28.37
8.9	23.88	72.03	59.848	29.66	9.45	11.45	22.287	27.61
18.9	24.16	68.67	60.083	29.58	9.81	9.89	22.540	27.07
28.9	24.56	65.54	60.356	29.70	10.24	8.63	22.834	26.77
8.9	25.09	62.71	60.660	30.04	10.71	7.70	23.161	26.71
18.8	25.72	60.28	60.985	30.56	11.23	7.13	23.515	26.90
28.8	26.42	58.32	61.325	31.26	11.78	6.93	23.885	27.30
7.8	27.19	56.90	61.674	32.09	12.34	7.09	24.266	27.93
17.8	28.00	56.04	62.024	33.04	12.92	7.60	24.650	28.73
27.7	28.82	55.79	62.369	34.07	13.49	8.45	25.029	29.69
6.7	29.63	56.17	62.705	35.15	14.04	9.62	25.398	30.80
16.7	30.41	57.19	63.026	36.26	14.58	11.08	25.751	32.00
26.6	31.13	58.79	63.327	37.38	15.08	12.80	26.087	33.29
6.6	31.75	60.94	63.608	38.48	15.55	14.75	26.398	34.63
16.6	32.27	63.58	63.864	39.55	15.98	16.90	26.683	36.02
26.6	32.67	66.59	64.093	40.58	16.35	19.20	26.938	37.42
5.5	32.93	69.87	64.291	41.56	16.67	21.61	27.159	38.82
15.5	33.03	73.31	64.456	42.49	16.92	24.08	27.344	40.20
25.5	32.99	76.77	64.584	43.35	17.11	26.56	27.486	41.54
5.5	32.79	80.13	64.673	44.13	17.22	28.98	27.584	42.81
15.4	32.44	83.27	64.720	44.81	17.26	31.28	27.635	43.96
25.4	31.97	86.09	64.722	45.39	17.22	33.37	27.637	45.00
35.4	31.38	88.48	64.681	45.84	17.10	35.21	27.590	45.87
Place	29.551	85.94	58.402	28.07	8.030	11.88	20.805	26.79
tan δ	3.739	-3.603	1.175	+0.616	2.054	+1.795	1.301	+0.832
D _α α	-0.02	+0.13	+0.07	-0.02	+0.10	-0.06	+0.08	-0.03
D _α δ	+0.2	+0.8	+0.2	+0.8	+0.2	+0.8	+0.2	+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	α Tauri. Mag. 3.9		A Tauri. Mag. 4.5		C Persei. Mag. 4.0		δ Tauri. Mag. 5.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 58 s	° ' " + 5 45 "	h m 3 59 s	° ' " +21 51 "	h m 4 2 s	° ' " +47 29 "	h m 4 5 s	° ' " +26 16 "
n. 0.4	49.750	48.83	53.065	38.71	45.306	52.79	52.516	11.98
10.4	49.702 48	48.05 78	53.018 47	38.65 6	45.225 81	53.94 115	52.471 45	12.13 15
20.3	49.618 84	47.34 71	52.932 86	38.51 14	45.091 134	54.83 89	52.385 86	12.19 6
30.3	49.503 115	46.70 64	52.813 119	38.29 22	44.911 180	55.40 57	52.263 122	12.13 6
b. 9.3	49.364 139 157	46.14 56 47	52.667 146 166	38.00 29 37	44.693 218 242	55.65 25 9	52.113 150 172	11.94 19 30
19.3	49.207	45.67	52.501	37.63	44.451	55.56	51.941	11.64
r. 1.2	49.041 166	45.31 36	52.326 175	37.19 44	44.197 254	55.13 43	51.758 183	11.21 43
11.2	48.878 163	45.07 24	52.153 173	36.69 50	43.946 251	54.37 76	51.576 182	10.69 52
21.2	48.724 154	44.94 13	51.992 161	36.15 54	43.713 233	53.32 105	51.407 169	10.08 61
31.1	48.591 133 103	44.95 1 17	51.852 140 107	35.61 54 52	43.512 201 153	52.02 130 147	51.258 149 116	9.41 67 68
r. 10.1	48.488	45.12	51.745	35.09	43.354	50.55	51.142	8.73
20.1	48.421 67	45.44 32	51.677 68	34.62 47	43.250 104	48.95 160	51.066 76	8.07 66
30.1	48.395 26	45.94 50	51.653 24	34.25 37	43.207 43	47.29 166	51.036 30	7.47 60
y 10.0	48.413 18	46.62 68	51.677 24	34.01 24	43.227 20	45.67 162	51.056 20	6.96 51
20.0	48.477 64 110	47.47 85 101	51.751 74 122	33.91 10 5	43.315 88 151	44.11 156 142	51.126 70 120	6.59 37 22
30.0	48.587	48.48	51.873	33.96	43.466	42.69	51.246	6.37
ne 9.0	48.739 152	49.65 117	52.040 167	34.19 23	43.677 211	41.46 123	51.412 166	6.32 5
18.9	48.928 189	50.93 128	52.249 209	34.59 40	43.944 267	40.44 102	51.622 210	6.45 13
28.9	49.152 224	52.30 137	52.493 244	35.15 56	44.260 316	39.68 76	51.869 247	6.74 29
ly 8.9	49.404 252 273	53.71 141 142	52.766 273 295	35.86 71 81	44.616 356 385	39.18 50 21	52.147 278 302	7.20 46 59
18.8	49.677	55.13	53.061	36.67	45.001	38.97	52.449	7.79
28.8	49.965 288	56.52 139	53.373 312	37.57 90	45.411 410	39.02 5	52.767 318	8.52 73
ig. 7.8	50.261 296	57.82 130	53.693 320	38.53 96	45.833 422	39.34 32	53.096 329	9.34 82
17.8	50.560 299	58.97 115	54.016 323	39.51 98	46.261 428	39.90 56	53.429 333	10.21 87
27.7	50.856 296 289	59.97 100 78	54.336 320 312	40.48 97 93	46.687 426 419	40.70 80 99	53.759 330 324	11.12 91 91
pt. 6.7	51.145	60.75	54.648	41.41	47.106	41.69	54.083	12.03
16.7	51.423 278	61.32 57	54.948 300	42.27 86	47.509 403	42.88 119	54.396 313	12.92 89
26.7	51.684 261	61.64 32	55.232 284	43.05 78	47.894 385	44.22 134	54.692 296	13.77 85
t. 6.6	51.928 244	61.72 8	55.497 265	43.72 67	48.254 360	45.69 147	54.971 279	14.56 79
16.6	52.152 224 199	61.57 15 36	55.741 244 220	44.29 57 47	48.586 332 298	47.27 158 168	55.228 257 233	15.27 71 66
26.6	52.351	61.21	55.961	44.76	48.884	48.95	55.461	15.93
iv. 5.5	52.524 173	60.68 53	56.154 193	45.14 33	49.145 261	50.67 172	55.666 205	16.52 59
15.5	52.670 146	60.00 68	56.317 163	45.43 29	49.363 218	52.41 174	55.841 175	17.05 53
25.5	52.784 114	59.22 78	56.446 129	45.63 20	49.534 171	54.15 174	55.982 141	17.52 47
x. 5.5	52.865 81 46	58.38 84 87	56.541 95 55	45.78 15 9	49.654 120 65	55.85 170 160	56.085 103 64	17.92 40 35
15.4	52.911	57.51	56.596	45.87	49.719	57.45	56.149	18.27
25.4	52.918 7 29	56.65 86 82	56.610 14 26	45.89 2 3	49.726 7 51	58.92 147 128	56.169 20 22	18.55 28 20
35.4	52.889	55.83	56.584	45.86	49.675	60.20	56.147	18.75
1 Place	47.571	45.62	50.682	31.94	42.192	41.18	50.027	4.61
2, Tan δ	1.005	+0.101	1.078	+0.401	1.480	+1.091	1.115	+0.494
, D _α α	+0.06	0.00	+0.07	-0.01	+0.09	-0.04	+0.07	-0.02
, D _α δ	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Eridani. Mag. 4.1			μ Tauri. Mag. 4.3			α Horologii. Mag. 3.8			α Retculi. Mag. 3.4		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 4 7	s	° ' " -7 2	h m 4 11	s	° ' " +8 41	h m 4 11	s	° ' " -42 29	h m 4 13	s	° ' " -62 40
Jan. 0.4	53.838		61.58	7.053		19.97	19.239		53.00	24.50		52.30
10.4	53.786	52	62.91 133	7.014	39	19.29 68	19.102	137	55.34 234	24.20	30	54.78 246
20.3	53.698	88	64.06 115	6.938	76	18.66 63	18.922	180	57.28 194	23.83	37	56.79 201
30.3	53.579	119	65.03 97	6.829	109	18.09 57	18.706	216	58.77 149	23.41	42	58.28 149
Feb. 9.3	53.435	144	65.77 74	6.694	135	17.58 51	18.462	244	59.77 100	22.95	46	59.21 93
		163			155			265			48	
19.3	53.272		66.29	6.539		17.14	18.197		60.27	22.47		59.58
Mar. 1.2	53.100	172	66.56 27	6.371	168	16.77 37	17.924	273	60.26 1	21.98	49	59.38 29
11.2	52.927	173	66.61 5	6.204	167	16.47 30	17.652	272	59.76 50	21.49	49	58.63 75
21.2	52.765	162	66.41 20	6.046	158	16.29 18	17.393	259	58.79 97	21.02	47	57.35 128
31.2	52.620	145	65.98 43	5.906	140	16.20 9	17.157	236	57.38 141	20.61	41	55.59 178
		116			111			201			38	
Apr. 10.1	52.504		65.30	5.795		16.24	16.956		55.55	20.23		53.39
20.1	52.422	82	64.39 91	5.719	76	16.41 17	16.794	162	53.34 221	19.91	32	50.80 289
30.1	52.380	42	63.24 115	5.684	35	16.74 33	16.680	114	50.80 254	19.66	25	47.87 283
May 10.0	52.380	0	61.90 134	5.692	8	17.22 48	16.619	61	48.01 279	19.49	17	44.69 313
20.0	52.426	46	60.36 154	5.746	54	17.88 66	16.613	6	45.00 301	19.40	9	41.33 336
		91			100			52			0	
30.0	52.517		58.65	5.846		18.68	16.665		41.87	19.40		37.86
June 9.0	52.650	133	56.83 182	5.988	142	19.63 95	16.771	106	38.69 318	19.48	8	34.36 350
18.9	52.823	173	54.93 190	6.171	183	20.71 108	16.929	158	35.51 318	19.64	16	30.91 345
28.9	53.031	208	52.99 194	6.389	218	21.90 119	17.135	206	32.44 307	19.88	24	27.62 329
July 8.9	53.267	236	51.08 191	6.635	246	23.14 124	17.384	249	29.55 289	20.20	32	24.58 304
		260			269			284			37	
18.9	53.527		49.24	6.904		24.40	17.668		26.94	20.57		21.87
28.8	53.804	277	47.55 169	7.189	285	25.66 126	17.981	313	24.68 226	21.00	43	19.56 231
Aug. 7.8	54.092	288	46.04 151	7.485	296	26.84 118	18.314	333	22.83 185	21.47	47	17.74 182
17.8	54.384	292	44.79 125	7.785	300	27.94 110	18.660	346	21.47 136	21.97	50	16.47 127
27.7	54.676	292	43.81 98	8.085	300	28.89 95	19.011	351	20.64 83	22.48	51	15.79 68
		286			294			347			51	
Sept. 6.7	54.962		43.17	8.379		29.66	19.358		20.38	22.99		15.74
16.7	55.238	276	42.87 30	8.663	284	30.24 58	19.693	335	20.71 33	23.48	49	16.32 58
26.7	55.499	261	42.91 4	8.934	271	30.61 37	20.011	318	21.63 92	23.95	47	17.53 121
Oct. 6.6	55.743	244	43.31 40	9.187	253	30.76 15	20.303	292	23.08 145	24.37	42	19.33 180
16.6	55.967	224	44.04 73	9.421	234	30.70 6	20.565	262	25.04 196	24.75	38	21.66 233
		199			212			224			31	
26.6	56.166		45.04	9.633		30.45	20.789		27.43	25.06		24.44
Nov. 5.6	56.340	174	46.30 126	9.821	188	30.04 41	20.973	184	30.17 274	25.29	23	27.58 314
15.5	56.486	146	47.73 143	9.980	159	29.49 55	21.112	139	33.16 299	25.45	16	30.96 338
25.5	56.599	113	49.28 155	10.108	128	28.85 64	21.203	91	36.28 312	25.53	8	34.44 348
Dec. 5.5	56.678	79	50.89 161	10.204	96	28.14 71	21.244	41	39.42 314	25.50	3	37.92 348
		44			59			10			9	
15.4	56.722		52.49	10.263		27.41	21.234		42.45	25.41		41.27
25.4	56.727	5	54.03 154	10.284	21	26.69 72	21.173	61	45.31 286	25.23	18	44.37 310
35.4	56.694	33	55.46 143	10.264	20	25.98 71	21.064	109	47.87 256	24.97	26	47.13 276
Mean Place	51.716		61.75	4.800		16.55	17.059		46.78	21.837		43.96
Sec δ , Tan δ	1.008		-0.124	1.012		+0.153	1.356		-0.916	2.179		-1.936
$D_{\psi} \alpha$, $D_{\omega} \alpha$	+0.06		0.00	+0.06		0.00	+0.04		+0.03	+0.02		+0.06
$D_{\psi} \delta$, $D_{\omega} \delta$	+0.2		+0.9	+0.2		+0.9	+0.2		+0.9	+0.2		+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	γ Tauri. Mag. 3.9		δ Tauri. Mag. 3.9		ν^5 Eridani. Mag. 4.1		δ Mensae. Mag. 5.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 15 s 4 15 s	° ' " +15 25 " +15 25 "	h m 4 18 s 4 18 s	° ' " +17 21 " +17 21 "	h m 4 20 s 4 20 s	° ' " -34 11 " -34 11 "	h m 4 23 s 4 23 s	° ' " -80 23 " -80 23 "
n. 0.4	9.839	54.79	14.601	9.17	59.543	88.99	34.18	94.21
10.4	9.804 35	54.43 36	14.569 32	8.91 26	59.448 95	91.25 226	33.17 101	96.64 243
20.3	9.732 72	54.07 36	14.497 72	8.62 29	59.310 138	93.17 192	31.98 119	98.60 196
30.3	9.623 109	53.70 37	14.389 108	8.32 30	59.137 173	94.68 151	30.67 131	100.03 143
b. 9.3	9.487 136	53.33 37	14.252 137	7.99 33	58.935 202	95.75 107	29.25 142	100.93 90
	159	38	160	35	222	63	147	34
19.3	9.328	52.95	14.092	7.64	58.713	96.38	27.78	101.27
mr. 1.2	9.159 169	52.57 38	13.921 171	7.27 37	58.479 234	96.55 17	26.29 149	101.03 24
11.2	8.988 171	52.20 37	13.747 174	6.89 38	58.244 235	96.27 28	24.82 147	100.27 76
21.2	8.826 162	51.86 34	13.582 165	6.51 38	58.018 226	95.55 72	23.40 142	98.98 129
31.2	8.682 144	51.56 30	13.436 146	6.15 36	57.812 206	94.40 115	22.07 133	97.22 176
	115	23	118	30	178	153	120	219
pr. 10.1	8.567	51.33	13.318	5.85	57.634	92.87	20.87	95.03
20.1	8.489 78	51.19 14	13.236 82	5.63 22	57.492 142	90.98 189	19.81 106	92.47 256
30.1	8.451 38	51.16 3	13.197 39	5.49 14	57.394 98	88.77 221	18.93 88	89.61 286
ay 10.0	8.458 7	51.26 10	13.203 6	5.48 1	57.344 50	86.29 248	18.24 69	86.49 312
20.0	8.512 54	51.51 25	13.256 53	5.61 13	57.344 0	83.59 270	17.76 48	83.19 330
	102	40	100	28	51	286	26	339
30.0	8.614	51.91	13.356	5.89	57.395	80.73	17.50	79.80
ne 9.0	8.760 146	52.46 55	13.502 146	6.32 43	57.496 101	77.79 294	17.46 4	76.39 341
18.9	8.946 186	53.15 69	13.687 185	6.89 57	57.644 148	74.83 296	17.65 19	73.04 335
28.9	9.169 223	53.96 81	13.910 223	7.60 71	57.836 192	71.93 290	18.05 40	69.85 319
ly 8.9	9.422 253	54.88 92	14.163 253	8.41 81	58.065 229	69.17 276	18.67 62	66.89 296
	275	98	277	89	263	253	79	261
18.9	9.697	55.86	14.440	9.30	58.328	66.64	19.46	64.28
28.8	9.990 293	56.88 102	14.734 294	10.23 93	58.615 287	64.40 224	20.41 95	62.06 222
g. 7.8	10.295 305	57.90 102	15.041 307	11.18 95	58.922 307	62.52 188	21.51 110	60.34 172
17.8	10.604 309	58.87 97	15.352 311	12.11 93	59.240 318	61.09 143	22.71 120	59.12 122
27.7	10.912 308	59.77 90	15.663 311	12.98 87	59.562 322	60.14 95	23.97 126	58.51 61
	302	80	306	79	320	42	128	1
pt. 6.7	11.214	60.57	15.969	13.77	59.882	59.72	25.25	58.50
16.7	11.508 294	61.23 66	16.267 298	14.43 66	60.194 312	59.83 11	26.51 126	59.14 64
26.7	11.788 280	61.75 82	16.552 285	14.98 55	60.491 297	60.49 66	27.70 119	60.38 124
t. 6.6	12.052 264	62.12 37	16.821 269	15.40 42	60.768 277	61.68 119	28.80 110	62.19 181
16.6	12.298 246	62.33 21	17.072 251	15.66 26	61.019 251	63.35 167	29.74 94	64.54 235
	224	7	229	15	221	210	76	279
26.6	12.522	62.40	17.301	15.81	61.240	65.45	30.50	67.33
v. 5.6	12.719 197	62.34 6	17.505 204	15.85 4	61.429 189	67.91 246	31.05 55	70.47 314
15.5	12.889 170	62.18 16	17.680 175	15.80 5	61.578 149	70.61 270	31.36 31	73.83 336
25.5	13.029 140	61.93 25	17.825 145	15.67 13	61.687 109	73.46 285	31.44 8	77.29 346
c. 5.5	13.133 104	61.64 29	17.935 110	15.49 18	61.752 65	76.36 290	31.24 20	80.73 844
	67	34	71	23	20	285	43	333
15.4	13.200	61.30	18.006	15.26	61.772	79.21	30.81	84.06
25.4	13.228 28	60.95 35	18.037 31	15.01 25	61.746 26	81.91 270	30.13 68	87.12 306
35.4	13.216 12	60.59 36	18.027 10	14.75 26	61.674 72	84.36 245	29.25 88	89.83 271
Place	7.489	50.15	12.212	4.29	57.392	84.13	28.841	85.54
l, Tan δ	1.038	+0.276	1.048	+0.312	1.209	-0.680	6.000	-5.916
D. α	+0.07	-0.01	+0.07	-0.01	+0.04	+0.02	-0.08	+0.16
D. δ	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ϵ Tauri. Mag. 3.6			m Persei. Mag. 6.1			α Tauri. (Aldebaran.) Mag. 1.1			ν Eridani. Mag. 4.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	'	h	m	'	h	m	'	h	m	'
	4	23	+18 59	4	27	+42 53	4	31	+16 20	4	32	- 3 30
	s		"	s		"	s		"	s		"
Jan. 0.4	52.023		63.49	41.530		32.74	15.220		47.73	15.449		68.60
10.4	51.995	28	63.30 19	41.488	42	33.76 102	15.198	22	47.41 32	15.417	32	69.88 128
20.4	51.926	69	63.09 21	41.392	96	34.61 85	15.135	63	47.09 32	15.347	70	70.99 111
30.3	51.821	105	62.85 24	41.248	144	35.22 61	15.035	100	46.77 32	15.242	105	71.95 96
Feb. 9.3	51.685	136	62.57 28	41.064	184	35.56 34	14.902	133	46.44 33	15.109	133	72.72 77
		161	32		214	7		156	34		157	38
19.3	51.524		62.25	40.850		35.63	14.746		46.10	14.952		73.30
Mar. 1.2	51.351	173	61.90 35	40.620	230	35.41 22	14.575	171	45.76 34	14.781	171	73.67 37
11.2	51.175	176	61.52 38	40.385	235	34.92 49	14.399	176	45.42 34	14.606	175	73.83 16
21.2	51.007	168	61.13 39	40.161	224	34.15 77	14.231	168	45.09 33	14.438	168	73.79 4
31.2	50.856	151	60.74 39	39.960	201	33.16 99	14.078	153	44.79 30	14.283	155	73.53 28
		122	36		164	118		125	24		129	47
Apr. 10.1	50.734		60.38	39.796		31.98	13.953		44.55	14.154		73.06
20.1	50.647	87	60.09 29	39.676	120	30.69 129	13.860	93	44.37 18	14.056	98	72.37 60
30.1	50.603	44	59.87 22	39.609	67	29.32 137	13.809	51	44.28 9	13.997	59	71.48 60
May 10.1	50.604	1	59.77 10	39.601	8	27.95 137	13.803	6	44.31 3	13.980	17	70.38 109
20.0	50.653	49	59.79 2	39.654	53	26.62 133	13.844	41	44.47 16	14.006	26	69.11 127
		96	16		112	124		87	31		71	143
30.0	50.749		59.95	39.766		25.38	13.931		44.78	14.077		67.68
June 9.0	50.889	140	60.27 32	39.935	169	24.29 109	14.062	131	45.21 43	14.191	114	66.11 157
18.9	51.073	184	60.72 45	40.158	223	23.37 92	14.236	174	45.78 57	14.345	154	64.44 167
28.9	51.293	220	61.30 58	40.428	270	22.66 71	14.447	211	46.48 70	14.535	190	62.72 172
July 8.9	51.545	252	62.01 71	40.739	311	22.16 50	14.687	240	47.27 79	14.756	221	61.00 172
		276	79		343	27		268	86		246	166
18.9	51.821		62.80	41.082		21.89	14.955		48.13	15.002		59.34
28.8	52.115	294	63.65 85	41.449	367	21.83 6	15.241	286	49.02 89	15.268	266	57.77 157
Aug. 7.8	52.422	307	64.52 87	41.834	385	21.99 16	15.540	299	49.92 90	15.548	280	56.36 141
17.8	52.735	313	65.38 86	42.228	394	22.35 36	15.847	307	50.78 86	15.834	286	55.16 120
27.8	53.050	315	66.21 83	42.626	398	22.89 54	16.156	309	51.58 80	16.124	290	54.21 95
		310	75		394	72		306	69		289	67
Sept. 6.7	53.360		66.96	43.020		23.61	16.462		52.27	16.413		53.54
16.7	53.661	301	67.62 66	43.406	386	24.46 85	16.761	299	52.86 59	16.695	282	53.19 35
26.7	53.952	291	68.17 55	43.778	372	25.44 98	17.050	289	53.31 45	16.967	272	53.16 3
Oct. 6.6	54.227	275	68.60 43	44.132	351	26.52 108	17.325	275	53.60 29	17.224	257	53.46 30
16.6	54.484	257	68.91 31	44.463	331	27.71 119	17.582	257	53.77 17	17.465	241	54.07 61
		237	19		305	125		239	3		220	88
26.6	54.721		69.10	44.768		28.96	17.821		53.80	17.685		54.95
Nov. 5.6	54.932	211	69.20 10	45.040	272	30.28 132	18.035	214	53.72 8	17.882	197	56.07 112
15.5	55.116	184	69.22 2	45.278	238	31.63 135	18.222	187	53.54 18	18.052	170	57.37 130
25.5	55.268	152	69.17 5	45.473	195	33.00 137	18.378	156	53.29 25	18.192	140	58.79 142
Dec. 5.5	55.384	116	69.08 9	45.621	148	34.37 137	18.500	122	53.00 29	18.298	106	60.27 148
		79	13		97	132		84	31		69	150
15.5	55.463		68.95	45.718		35.69	18.584		52.69	18.367		61.77
25.4	55.500	37	68.80 15	45.760	42	36.94 125	18.627	43	52.36 33	18.397	30	63.22 145
35.4	55.494	6	68.62 18	45.748	12	38.05 111	18.628	1	52.03 33	18.387	10	64.57 135
Mean Place	49.587		58.56	38.472		23.86	12.798		43.69	13.227		68.93
Sec δ , Tan δ	1.058		+0.344	1.365		+0.929	1.042		+0.293	1.002		-0.061
$D_{\delta} a$, $D_{\alpha} a$	+0.07		-0.01	+0.08		-0.02	+0.07		-0.01	+0.06		0.00
$D_{\delta} \delta$, $D_{\alpha} \delta$	+0.2		+0.9	+0.2		+0.9	+0.2		+0.9	+0.1		+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Doradus. Mag. 3.5		δ Eridani. Mag. 4.0		τ Tauri. Mag. 4.3		Groombridge 848. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 32 s	° ' " -55 12 "	h m 4 34 s	° ' " -14 27 "	h m 4 37 s	° ' " +22 48 "	h m 4 37 s	° ' " +75 47 "
Jan. 0.4	15.894	58.47	27.569	49.90	21.840	7.26	54.05	50.73
10.4	15.698 ¹⁹⁶	61.14 ²⁶⁷	27.527 ⁴²	51.65 ¹⁷⁵	21.823 ¹⁷	7.27 ¹	53.79 ²⁶	53.24 ²⁵¹
20.4	15.445 ²⁵³	63.39 ²²⁵	27.445 ⁸²	53.16 ¹⁵¹	21.762 ⁶¹	7.25 ²	53.38 ⁴¹	55.42 ²¹⁸
30.3	15.144 ³⁰¹	65.16 ¹⁷⁷	27.328 ¹¹⁷	54.42 ¹²⁶	21.661 ¹⁰¹	7.18 ⁷	52.82 ⁵⁶	57.19 ¹⁷⁷
Feb. 9.3	14.804 ³⁴⁰	66.41 ¹²⁵	27.182 ¹⁴⁶	55.41 ⁹⁹	21.527 ¹³⁴	7.04 ¹⁴	52.15 ⁶⁷	58.47 ¹²⁸
	367	70	170	68	162	22	74	75
19.3	14.437	67.11	27.012	56.09	21.365	6.82	51.41	59.22
Mar. 1.3	14.055 ³⁸²	67.27 ¹⁶	26.829 ¹⁸³	56.46 ³⁷	21.188 ¹⁷⁷	6.54 ²⁸	50.62 ⁷⁹	59.41 ¹⁹
11.2	13.671 ³⁸⁴	66.88 ³⁹	26.642 ¹⁸⁷	56.54 ⁸	21.005 ¹⁸³	6.18 ³⁶	49.82 ⁸⁰	59.03 ³⁸
21.2	13.299 ³⁷²	65.96 ⁹²	26.460 ¹⁸²	56.30 ²⁴	20.827 ¹⁷⁸	5.77 ⁴¹	49.06 ⁷⁶	58.11 ⁹²
31.2	12.953 ³⁴⁶	64.54 ¹⁴²	26.294 ¹⁶⁶	55.77 ⁵³	20.666 ¹⁶¹	5.32 ⁴⁵	48.35 ⁷¹	56.67 ¹⁴⁴
	310	186	143	84	135	46	61	185
Apr. 10.1	12.643	62.68	26.151	54.93	20.531	4.86	47.74	54.82
20.1	12.380 ²⁶³	60.39 ²²⁹	26.041 ¹¹⁰	53.82 ¹¹¹	20.432 ⁹⁹	4.42 ⁴⁴	47.27 ⁴⁷	52.59 ²²³
30.1	12.172 ²⁰⁸	57.75 ²⁶⁴	25.968 ⁷³	52.45 ¹³⁷	20.375 ⁵⁷	4.02 ⁴⁰	46.93 ³⁴	50.09 ²⁵⁰
May 10.1	12.028 ¹⁴⁴	54.81 ²⁹⁴	25.938 ³⁰	50.84 ¹⁶¹	20.364 ¹¹	3.71 ³¹	46.76 ¹⁷	47.42 ²⁶⁷
20.0	11.949 ⁷⁹	51.65 ³¹⁶	25.952 ¹⁴	49.02 ¹⁸²	20.401 ³⁷	3.50 ²¹	46.76 ⁰	44.65 ²⁷⁷
	8	333	59	198	86	10	15	276
30.0	11.941	48.32	26.011	47.04	20.487	3.40	46.91	41.89
June 9.0	12.002 ⁶¹	44.92 ³⁴⁰	26.114 ¹⁰³	44.92 ²¹²	20.619 ¹³²	3.44 ⁴	47.23 ³²	39.22 ²⁶⁷
19.0	12.130 ¹²⁸	41.53 ³³⁹	26.258 ¹⁴⁴	42.74 ²¹⁸	20.795 ¹⁷⁶	3.63 ¹⁹	47.71 ⁴⁸	36.71 ²⁵¹
28.9	12.323 ¹⁹³	38.23 ³³⁰	26.440 ¹⁸²	40.54 ²²⁰	21.009 ²¹⁴	3.94 ³¹	48.32 ⁶¹	34.44 ²²⁷
July 8.9	12.575 ²⁵²	35.13 ³¹⁰	26.655 ²¹⁵	38.37 ²¹⁷	21.257 ²⁴⁸	4.37 ⁴³	49.06 ⁷⁴	32.45 ¹⁹⁹
	304	283	240	204	273	54	85	164
18.9	12.879	32.30	26.895	36.33	21.530	4.91	49.91	30.81
28.8	13.226 ³⁴⁷	29.84 ²⁴⁶	27.159 ²⁶⁴	34.45 ¹⁸⁸	21.825 ²⁹⁵	5.53 ⁶²	50.85 ⁹⁴	29.54 ¹²⁷
Aug. 7.8	13.608 ³⁸²	27.82 ²⁰²	27.437 ²⁷⁸	32.81 ¹⁶⁴	22.135 ³¹⁰	6.21 ⁶⁸	51.85 ¹⁰⁰	28.66 ⁸⁸
17.8	14.016 ⁴⁰⁸	26.31 ¹⁵¹	27.724 ²⁶⁷	31.46 ¹³⁵	22.452 ³¹⁷	6.90 ⁶⁹	52.90 ¹⁰⁵	28.19 ⁴⁷
27.8	14.438 ⁴²²	25.37 ⁹⁴	28.016 ²⁹²	30.46 ¹⁰⁰	22.773 ³²¹	7.60 ⁷⁰	53.98 ¹⁰⁸	28.14 ⁵
	426	34	290	62	319	66	108	37
Sept. 6.7	14.864	25.03	28.306	29.84	23.092	8.26	55.06	28.51
16.7	15.284 ⁴²⁰	25.32 ²⁹	28.591 ²⁸⁵	29.63 ²¹	23.405 ³¹³	8.87 ⁶¹	56.14 ¹⁰⁸	29.29 ⁷⁸
26.7	15.685 ⁴⁰¹	26.25 ⁹³	28.865 ²⁷⁴	29.84 ²¹	23.708 ³⁰³	9.41 ⁵⁴	57.19 ¹⁰⁵	30.47 ¹¹⁸
Oct. 6.7	16.059 ³⁷⁴	27.77 ¹⁵²	29.124 ²⁵⁹	30.46 ⁶²	23.998 ²⁹⁰	9.87 ⁴⁶	58.18 ⁹⁹	32.02 ¹⁵⁵
16.6	16.396 ³³⁷	29.85 ²⁰⁸	29.366 ²⁴²	31.47 ¹⁰¹	24.272 ²⁷⁴	10.24 ³⁷	59.11 ⁹³	33.91 ¹⁸⁹
	291	257	220	135	253	30	85	222
26.6	16.687	32.42	29.586	32.82	24.525	10.54	59.96	36.13
Nov. 5.6	16.925 ²³⁸	35.38 ²⁹⁶	29.782 ¹⁹⁶	34.47 ¹⁶⁵	24.755 ²³⁰	10.76 ²²	60.70 ⁷⁴	38.62 ²⁴⁹
15.5	17.104 ¹⁷⁹	38.62 ³²⁴	29.948 ¹⁶⁶	36.33 ¹⁸⁶	24.956 ²⁰¹	10.94 ¹⁸	61.33 ⁶³	41.32 ²⁷⁰
25.5	17.219 ¹¹⁵	42.04 ³⁴²	30.083 ¹³⁵	38.35 ²⁰²	25.126 ¹⁷⁰	11.07 ¹³	61.81 ⁴⁸	44.18 ²⁸⁶
Dec. 5.5	17.265 ⁴⁶	45.50 ³⁴⁶	30.182 ⁹⁹	40.44 ²⁰⁹	25.261 ¹³⁵	11.17 ¹⁰	62.15 ³⁴	47.13 ²⁹⁵
	23	339	60	208	95	8	17	295
15.5	17.242	48.89	30.242	42.52	25.356	11.25	62.32	50.08
25.4	17.150 ⁹²	52.10 ³²¹	30.263 ²¹	44.53 ²⁰¹	25.408 ⁵²	11.31 ⁶	62.32 ⁰	52.94 ²⁸⁶
35.4	16.993 ¹⁵⁷	55.00 ²⁹⁰	30.242 ²¹	46.40 ¹⁸⁷	25.415 ⁷	11.34 ³	62.16 ¹⁶	55.62 ²⁶⁸
Mean Place	13.404	51.39	25.392	48.26	19.291	2.40	46.387	39.06
Sec δ , Tan δ	1.753	-1.440	1.033	-0.258	1.085	+0.420	4.075	+3.951
D ϕ α , D ω α	+0.03	+0.03	+0.05	+0.01	+0.07	-0.01	+0.16	-0.09
D ϕ δ , D ω δ	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Caeli. Mag. 4.5		4 Camelop. Mag. 5.4		μ Eridani. Mag. 4.2		π^3 Orionis. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 37 s	° ' " -42 0 "	h m 4 41 s	° ' " +56 36 "	h m 4 41 s	° ' " -3 23 "	h m 4 45 s	° ' " + 6 49 "
Jan. 0.4	57.325	77.97	13.924	56.51	26.338	74.25	25.582	10.91
10.4	57.215 110	80.54 257	13.863 61	58.26 175	26.314 24	75.55 130	25.570 12	10.09 82
20.4	57.057 158	82.73 219	13.729 134	59.76 150	26.250 64	76.71 116	25.516 54	9.36 73
30.3	56.858 199	84.50 177	13.530 199	60.95 119	26.152 98	77.68 97	25.426 90	8.71 65
Feb. 9.3	56.626 232	85.81 131	13.276 254	61.78 83	26.021 131	78.48 80	25.302 124	8.16 55
	259	81	295	45	154	89	148	46
19.3	56.367	86.62	12.981	62.23	25.867	79.07	25.154	7.70
Mar. 1.3	56.093 274	86.94 32	12.660 321	62.25 2	25.696 171	79.47 40	24.988 166	7.34 36
11.2	55.817 276	86.76 18	12.331 329	61.86 39	25.520 176	79.65 18	24.816 172	7.09 25
21.2	55.548 269	86.09 67	12.013 318	61.08 78	25.348 172	79.63 2	24.648 168	6.95 14
31.2	55.297 251	84.96 113	11.723 290	59.93 115	25.191 157	79.39 24	24.493 155	6.92 3
	224	157	246	145	135	44	132	9
Apr. 10.1	55.073	83.39	11.477	58.48	25.056	78.95	24.361	7.01
20.1	54.886 187	81.44 195	11.289 188	56.77 171	24.952 104	78.29 66	24.260 101	7.25 24
30.1	54.745 141	79.14 230	11.166 123	54.90 187	24.885 67	77.43 86	24.197 63	7.63 38
May 10.1	54.655 90	76.52 262	11.119 47	52.92 198	24.860 25	76.38 105	24.176 21	8.16 53
20.0	54.617 38	73.67 285	11.148 29	50.91 201	24.878 18	75.13 125	24.199 23	8.84 68
	17	303	109	197	62	139	67	82
30.0	54.634	70.64	11.257	48.94	24.940	73.74	24.266	9.66
June 9.0	54.706 72	67.51 313	11.441 184	47.07 187	25.046 106	72.21 153	24.377 111	10.61 95
19.0	54.831 125	64.36 315	11.694 253	45.37 170	25.194 148	70.57 164	24.529 152	11.67 106
28.9	55.006 175	61.28 308	12.012 318	43.87 150	25.375 181	68.89 168	24.716 187	12.83 116
July 8.9	55.226 220	58.32 296	12.385 373	42.61 126	25.589 214	67.20 169	24.937 221	14.03 120
	259	273	420	99	240	164	246	121
18.9	55.485	55.59	12.805	41.62	25.829	65.56	25.183	15.24
28.8	55.775 290	53.18 241	13.262 457	40.92 70	26.090 261	64.01 155	25.450 267	16.41 117
Aug. 7.8	56.092 317	51.16 202	13.747 485	40.50 42	26.366 276	62.61 140	25.732 282	17.52 111
17.8	56.425 333	49.61 155	14.249 502	40.39 11	26.651 285	61.42 119	26.023 291	18.52 100
27.8	56.769 344	48.55 106	14.761 512	40.57 18	26.940 289	60.47 95	26.318 295	19.36 84
	346	48	513	46	289	66	295	65
Sept. 6.7	57.115	48.07	15.274	41.03	27.229	59.81	26.613	20.01
16.7	57.456 341	48.16 9	15.781 507	41.76 73	27.513 284	59.47 34	26.904 291	20.45 44
26.7	57.784 328	48.84 68	16.273 492	42.74 98	27.788 275	59.44 8	27.186 282	20.65 20
Oct. 6.7	58.092 308	50.09 125	16.746 473	43.97 123	28.049 261	59.75 31	27.457 271	20.63 2
16.6	58.375 283	51.88 179	17.191 445	45.40 143	28.295 246	60.36 61	27.712 255	20.37 26
	251	226	411	164	228	89	238	46
26.6	58.626	54.14	17.602	47.04	28.523	61.25	27.950	19.91
Nov. 5.6	58.839 213	56.80 266	17.971 369	48.84 180	28.727 204	62.39 114	28.165 215	19.28 63
15.5	59.011 172	59.75 295	18.292 321	50.77 193	28.905 178	63.71 132	28.356 191	18.51 77
25.5	59.136 125	62.89 314	18.557 265	52.80 203	29.053 148	65.15 144	28.517 161	17.64 87
Dec. 5.5	59.212 76	66.09 320	18.758 201	54.87 207	29.169 116	66.65 150	28.645 128	16.72 92
	24	316	131	207	78	152	92	93
15.5	59.236	69.25	18.889	56.94	29.247	68.17	28.737	15.79
25.4	59.207 29	72.26 301	18.946 57	58.94 200	29.284 87	69.64 147	28.788 51	14.88 91
35.4	59.126 81	75.03 277	18.927 19	60.81 187	29.283 1	71.03 139	28.798 10	14.01 87
Mean Place	55.055	72.37	9.997	46.95	24.090	74.37	23.237	9.19
Sec δ , Tan δ	1.346	-0.901	1.818	+1.517	1.002	-0.059	1.007	+0.120
D δ a, D ω a	+0.04	+0.02	+0.10	-0.03	+0.06	0.00	+0.06	0.00
D δ δ , D ω δ	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Aurigæ. Var. 3.0-4.5		β Camelop. Mag. 4.2		ζ Aurigæ. Mag. 3.9		ι Tauri. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 56	° ' +43 42	h m 4 56	° ' +60 19	h m 4 56	° ' +40 57	h m 4 58	° ' +21 28
	s " "	" "	s " "	" "	s " "	" "	s " "	" "
Jan. 0.4	8.140	18.26	11.37	35.10	47.701	33.10	14.182	29.14
10.4	8.131 ⁹	19.41 ¹¹⁵	11.32 ⁵	37.08 ¹⁹⁸	47.693 ⁸	34.12 ¹⁰²	14.183 ¹	29.09 ⁵
20.4	8.061 ⁷⁰	20.43 ¹⁰²	11.19 ¹³	38.83 ¹⁷⁵	47.630 ⁶³	35.00 ⁸⁸	14.139 ⁴⁴	29.03 ⁶
30.3	7.938 ¹²³	21.25 ⁸²	10.98 ²¹	40.28 ¹⁴⁵	47.515 ¹¹⁵	35.71 ⁷¹	14.053 ⁸⁶	28.95 ⁸
Feb. 9.3	7.768 ¹⁷⁰	21.83 ⁵⁸	10.70 ²⁸	41.36 ¹⁰⁸	47.356 ¹⁵⁹	36.22 ⁵¹	13.929 ¹²⁴	28.84 ¹¹
	207	31	32	68	192	26	154	16
19.3	7.561	22.14	10.38	42.04	47.164	36.48	13.775	28.68
Mar. 1.3	7.330 ²³¹	22.18 ⁴	10.01 ³⁷	42.28 ²⁴	46.946 ²¹⁸	36.49 ¹	13.602 ¹⁷³	28.45 ²³
11.2	7.088 ²⁴²	21.92 ²⁶	9.64 ³⁷	42.08 ²⁰	46.716 ²³⁰	36.23 ²⁶	13.419 ¹⁸³	28.19 ²⁶
21.2	6.850 ²³⁸	21.40 ⁵²	9.27 ³⁷	41.44 ⁶⁴	46.489 ²²⁷	35.73 ⁵⁰	13.238 ¹⁸¹	27.88 ³¹
31.2	6.630 ²²⁰	20.61 ⁷⁹	8.94 ³³	40.40 ¹⁰⁴	46.276 ²¹³	35.00 ⁷³	13.070 ¹⁶⁸	27.54 ³⁴
	191	100	29	139	181	91	146	36
Apr. 10.2	6.439	19.61	8.65	39.01	46.095	34.09	12.924	27.18
20.1	6.291 ¹⁴⁸	18.42 ¹¹⁹	8.41 ²⁴	37.31 ¹⁷⁰	45.952 ¹⁴³	33.01 ¹⁰⁸	12.812 ¹¹²	26.83 ³⁵
30.1	6.192 ⁹⁹	17.13 ¹²⁹	8.25 ¹⁶	35.39 ¹⁹²	45.859 ⁹³	31.82 ¹¹⁹	12.738 ⁷⁴	26.53 ³⁰
May 10.1	6.151 ⁴¹	15.78 ¹³⁵	8.16 ⁹	33.31 ²⁰⁸	45.819 ⁴⁰	30.60 ¹²²	12.708 ³⁰	26.29 ²⁴
20.0	6.168 ¹⁷	14.42 ¹³⁶	8.16 ⁰	31.16 ²¹⁵	45.836 ¹⁷	29.38 ¹²²	12.725 ¹⁷	26.13 ¹⁶
	77	132	9	215	75	116	64	6
30.0	6.245	13.10	8.25	29.01	45.911	28.22	12.789	26.07
June 9.0	6.381 ¹³⁶	11.87 ¹²³	8.41 ¹⁶	26.93 ²⁰⁸	46.043 ¹³²	27.14 ¹⁰⁸	12.900 ¹¹¹	26.13 ⁶
19.0	6.573 ¹⁹²	10.77 ¹¹⁰	8.66 ²⁵	24.97 ¹⁹⁶	46.227 ¹⁸⁴	26.18 ⁹⁶	13.054 ¹⁵⁴	26.30 ¹⁷
28.9	6.815 ²⁴²	9.83 ⁹⁴	8.98 ³²	23.19 ¹⁷⁸	46.460 ²³³	25.38 ⁸⁰	13.247 ¹⁹³	26.59 ²⁹
July 8.9	7.099 ²⁸⁴	9.07 ⁷⁶	9.36 ³⁸	21.65 ¹⁵⁴	46.735 ²⁷⁵	24.76 ⁶²	13.475 ²²⁸	26.98 ³⁹
	323	57	44	128	311	45	257	47
18.9	7.422	8.50	9.80	20.37	47.046	24.31	13.732	27.45
28.9	7.774 ³⁵²	8.13 ³⁷	10.28 ⁴⁸	19.35 ¹⁰²	47.384 ³³⁸	24.05 ²⁶	14.012 ²⁸⁰	27.99 ⁵⁴
Aug. 7.8	8.148 ³⁷⁴	7.96 ¹⁷	10.80 ⁵²	18.65 ⁷⁰	47.745 ³⁶¹	23.96 ⁹	14.308 ²⁹⁶	28.56 ⁵⁷
17.8	8.536 ³⁸⁸	7.97 ¹	11.34 ⁵⁴	18.24 ⁴¹	48.119 ³⁷⁴	24.05 ⁹	14.617 ³⁰⁹	29.14 ⁵⁸
27.8	8.935 ³⁹⁹	8.18 ²¹	11.90 ⁵⁶	18.16 ⁸	48.501 ³⁸²	24.30 ²⁵	14.931 ³¹⁴	29.71 ⁵⁷
	401	36	57	22	385	38	317	51
Sept. 6.7	9.336	8.54	12.47	18.38	48.886	24.68	15.248	30.22
16.7	9.732 ³⁹⁶	9.06 ⁵²	13.03 ⁵⁶	18.90 ⁵²	49.268 ³⁸²	25.18 ⁵⁰	15.562 ³¹⁴	30.67 ⁴⁵
26.7	10.122 ³⁹⁰	9.73 ⁶⁷	13.58 ⁵⁵	19.72 ⁸²	49.643 ³⁷⁵	25.81 ⁶³	15.868 ³⁰⁶	31.03 ³⁶
Oct. 6.7	10.499 ³⁷⁷	10.52 ⁷⁹	14.12 ⁵⁴	20.81 ¹⁰⁹	50.005 ³⁶²	26.55 ⁷⁴	16.165 ²⁹⁷	31.31 ²⁸
16.6	10.857 ³⁵⁸	11.43 ⁹¹	14.63 ⁵¹	22.15 ¹³⁴	50.349 ³⁴⁴	27.37 ⁸²	16.449 ²⁸⁴	31.50 ¹⁹
	337	102	47	159	324	91	267	11
26.6	11.194	12.45	15.10	23.74	50.673	28.28	16.716	31.61
Nov. 5.6	11.503 ³⁰⁹	13.56 ¹¹¹	15.53 ⁴³	25.53 ¹⁷⁹	50.970 ²⁹⁷	29.26 ⁹⁸	16.961 ²⁴⁵	31.65 ⁴
15.6	11.777 ²⁷⁴	14.77 ¹²¹	15.91 ³⁸	27.50 ¹⁹⁷	51.234 ²⁶⁴	30.31 ¹⁰⁵	17.180 ²¹⁹	31.64 ¹
25.5	12.012 ²³⁵	16.03 ¹²⁶	16.22 ³¹	29.62 ²¹²	51.460 ²²⁶	31.41 ¹¹⁰	17.371 ¹⁹¹	31.60 ⁴
Dec. 5.5	12.200 ¹⁸⁸	17.34 ¹³¹	16.46 ²⁴	31.82 ²²⁰	51.643 ¹⁸³	32.55 ¹¹⁴	17.526 ¹⁵⁵	31.54 ⁶
	135	132	17	223	133	115	115	6
15.5	12.335	18.66	16.63	34.05	51.776	33.70	17.641	31.48
25.4	12.415 ⁸⁰	19.95 ¹²⁹	16.71 ⁸	36.25 ²²⁰	51.856 ⁸⁰	34.83 ¹¹³	17.713 ⁷²	31.42 ⁶
35.4	12.436 ²¹	21.16 ¹²¹	16.71 ⁰	38.33 ²⁰⁸	51.883 ²⁷	35.90 ¹⁰⁷	17.740 ²⁷	31.37 ⁵
Mean Place	4.922	11.62	7.002	26.60	44.592	26.88	11.591	25.73
Sec δ, Tan δ	1.383	+0.956	2.020	+1.755	1.324	+0.868	1.075	+0.393
Dψ a, Dω a	+0.09	-0.02	+0.11	-0.03	+0.08	-0.02	+0.07	-0.01
Dψ δ, Dω δ	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Time.	11 Orionis. Mag. 4.6		η Aurigæ. Mag. 3.3		ε Leporis. Mag. 3.3		β Eridani. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 59 s 45.422 2	° ' " +15 17 " 40	h m 5 0 s 48.862 4	° ' " +41 7 " 104	h m 5 1 s 61.591 33	° ' " -22 28 " 219	h m 5 3 s 51.392 8	° ' " - 5 11 " 147
1. 0.4	55.422	29.87	48.862	35.29	61.591	52.20	51.392	29.91
10.4	55.424	29.47	48.858	36.33	61.558	54.39	51.384	31.38
20.4	55.382	29.11	48.798	37.24	61.481	56.34	51.335	32.69
30.4	55.299	28.78	48.686	37.97	61.365	57.97	51.246	33.80
b. 9.3	55.180	28.48	48.528	38.51	61.214	59.27	51.123	34.71
19.3	55.033	28.19	48.334	38.80	61.036	60.22	50.973	35.40
r. 1.3	54.865	27.92	48.115	38.84	60.840	60.78	50.803	35.88
11.2	54.689	27.66	47.884	38.62	60.635	60.97	50.624	36.12
21.2	54.513	27.42	47.655	38.15	60.431	60.79	50.445	36.14
31.2	54.350	27.22	47.443	37.44	60.238	60.24	50.278	35.93
r. 10.2	54.208	27.06	47.258	36.54	60.066	59.35	50.130	35.50
20.1	54.096	26.96	47.113	35.48	59.923	58.12	50.011	34.84
30.1	54.022	26.93	47.015	34.30	59.816	56.58	49.926	33.98
y 10.1	53.991	27.00	46.972	33.08	59.751	54.77	49.880	32.91
20.1	54.004	27.19	46.985	31.86	59.729	52.71	49.877	31.64
30.0	54.063	27.49	47.055	30.68	59.753	50.46	49.918	30.22
ne 9.0	54.166	27.90	47.182	29.58	59.822	48.07	50.001	28.66
19.0	54.312	28.43	47.363	28.60	59.935	45.60	50.125	27.00
28.9	54.495	29.06	47.592	27.77	60.089	43.11	50.287	25.29
ly 8.9	54.713	29.77	47.863	27.11	60.278	40.67	50.481	23.57
18.9	54.959	30.53	48.171	26.61	60.500	38.35	50.705	21.90
28.9	55.227	31.31	48.507	26.31	60.748	36.24	50.951	20.33
ig. 7.8	55.511	32.09	48.866	26.17	61.016	34.38	51.216	18.91
17.8	55.807	32.81	49.239	26.20	61.298	32.86	51.492	17.72
27.8	56.110	33.47	49.621	26.40	61.591	31.73	51.776	16.77
pt. 6.8	56.414	34.02	50.006	26.73	61.888	31.04	52.063	16.12
16.7	56.716	34.44	50.390	27.19	62.184	30.81	52.349	15.80
26.7	57.012	34.71	50.767	27.76	62.474	31.07	52.630	15.82
t. 6.7	57.299	34.83	51.132	28.46	62.753	31.80	52.901	16.19
16.6	57.573	34.81	51.480	29.24	63.017	33.00	53.159	16.89
26.6	57.829	34.66	51.809	30.11	63.261	34.61	53.401	17.88
v. 5.6	58.066	34.38	52.111	31.07	63.481	36.56	53.622	19.14
15.6	58.277	34.02	52.381	32.10	63.673	38.81	53.820	20.59
25.5	58.460	33.60	52.615	33.19	63.832	41.24	53.988	22.20
c. 5.5	58.609	33.15	52.803	34.32	63.953	43.78	54.124	23.87
15.5	58.721	32.69	52.941	35.47	64.033	46.34	54.222	25.56
25.5	58.791	32.25	53.026	36.61	64.070	48.83	54.279	27.20
35.4	58.817	31.83	53.055	37.69	64.062	51.15	54.295	28.75
Place	52.930	27.47	45.730	29.38	59.350	49.27	49.097	29.23
, Tan δ	1.037	+0.273	1.328	+0.873	1.082	-0.414	1.004	-0.091
D _α α	+0.07	0.00	+0.08	-0.02	+0.05	+0.01	+0.06	0.00
D _α δ	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Aurigæ. Mag. 4.8			19 H. Camelop. Mag. 5.2			μ Leporis. Mag. 3.3			β Orionis. (Rigel.) Mag. 0.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 5 7	s	° ' " +38 23	h m 5 9	s	° ' " +79 8	h m 5 9	s	° ' " -16 17	h m 5 10	s	° ' " - 8 17
Jan. 0.4	51.896	8	23.95	11.21	22	32.30	17.115	15	68.29	38.067	6	44.79
10.4	51.904	50	24.85	10.99	45	35.09	17.100	60	70.29	38.061	46	46.42
20.4	51.854	100	25.65	10.54	63	37.61	17.040	99	72.06	38.015	88	47.89
30.4	51.754	145	26.30	9.91	81	39.77	16.941	134	73.56	37.927	124	49.13
Feb. 9.3	51.609	182	26.79	9.10	94	41.48	16.807	163	74.77	37.803	150	50.15
19.3	51.427	209	27.07	8.16	102	42.68	16.644	182	75.68	37.653	172	50.92
Mar. 1.3	51.218	220	27.13	7.14	106	43.33	16.462	193	76.26	37.481	182	51.45
11.2	50.998	220	26.95	6.08	105	43.40	16.269	193	76.51	37.299	182	51.71
21.2	50.778	206	26.56	5.03	99	42.88	16.076	183	76.44	37.117	173	51.72
31.2	50.572	182	25.96	4.04	89	41.82	15.893	163	76.05	36.944	154	51.47
Apr. 10.2	50.390	144	25.16	3.15	76	40.26	15.730	137	75.34	36.790	126	50.98
20.1	50.246	99	24.24	2.39	58	38.27	15.593	101	74.34	36.664	93	50.24
30.1	50.147	47	23.22	1.81	39	35.93	15.492	62	73.06	36.571	53	49.27
May 10.1	50.100	6	22.14	1.42	19	33.31	15.430	20	71.52	36.518	11	48.08
20.1	50.106	61	21.06	1.23	3	30.53	15.410	25	69.77	36.507	32	46.69
30.0	50.167	115	20.02	1.26	23	27.66	15.435	69	67.82	36.539	74	45.12
June 9.0	50.282	167	19.06	1.49	45	24.80	15.504	110	65.72	36.613	116	43.42
19.0	50.449	215	18.21	1.94	64	22.02	15.614	150	63.54	36.729	154	41.62
28.9	50.664	256	17.50	2.58	81	19.42	15.764	185	61.32	36.883	187	39.77
July 8.9	50.920	291	16.92	3.39	97	17.05	15.949	216	59.13	37.070	217	37.92
18.9	51.211	318	16.50	4.36	110	14.95	16.165	240	57.03	37.287	240	36.13
28.9	51.529	342	16.25	5.46	122	13.20	16.405	262	55.08	37.527	261	34.46
Aug. 7.8	51.871	358	16.14	6.68	130	11.80	16.667	276	53.37	37.788	274	32.96
17.8	52.229	366	16.18	7.98	136	10.81	16.943	286	51.93	38.062	282	31.69
27.8	52.595	371	16.34	9.34	140	10.23	17.229	290	50.84	38.344	286	30.70
Sept. 6.8	52.966	370	16.63	10.74	140	10.08	17.519	290	50.14	38.630	287	30.04
16.7	53.336	364	17.01	12.14	139	10.35	17.809	286	49.85	38.917	282	29.73
26.7	53.700	355	17.48	13.53	136	11.05	18.095	276	50.00	39.199	274	29.79
Oct. 6.7	54.055	341	18.04	14.89	127	12.16	18.371	262	50.59	39.473	261	30.21
16.6	54.396	323	18.67	16.16	120	13.67	18.633	247	51.60	39.734	247	31.00
26.6	54.719	297	19.38	17.36	107	15.55	18.880	225	52.99	39.981	226	32.12
Nov. 5.6	55.016	268	20.15	18.43	92	17.78	19.105	197	54.71	40.207	201	33.51
15.6	55.284	234	20.99	19.35	77	20.30	19.302	167	56.69	40.408	173	35.13
25.5	55.518	191	21.88	20.12	57	23.05	19.469	132	58.87	40.581	140	36.90
Dec. 5.5	55.709	144	22.82	20.69	35	25.97	19.601	95	61.13	40.721	102	38.76
15.5	55.853	91	23.78	21.04	14	28.98	19.696	52	63.42	40.823	61	40.64
25.5	55.944	38	24.75	21.18	10	31.99	19.748	8	65.66	40.884	19	42.48
35.4	55.982		25.68	21.08		34.89	19.756		67.76	40.903		44.21
Mean Place	48.843		18.95	1.021		23.81	14.855		66.09	35.774		43.56
Sec δ , Tan δ	1.276		+0.792	5.307		+5.212	1.042		-0.292	1.011		-0.146
D ϕ α , D ω α	+0.08		-0.01	+0.20		-0.08	+0.05		0.00	+0.06		0.00
D ϕ δ , D ω δ	+0.1		+1.0	+0.1		+1.0	+0.1		+1.0	+0.1		+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ ¹ Orionis. Mag. 4.5			♌ Orionis. Mag. 2.9			♋ Orionis. Mag. 1.8			♉ Tauri. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	5	30	+ 9 26	5	31	- 5 57	5	32	- 1 15	5	32	+21 5
	s		"	s		"	s		"	s		"
Jan. 0.5	21.551		6.10	27.639		47.57	5.497		12.70	47.268		38.02
10.4	21.577	26	5.33 77	27.654	15	49.16 159	5.517	20	14.07 137	47.303	35	37.93 9
20.4	21.557	20	4.66 67	27.625	29	50.60 144	5.493	24	15.28 121	47.288	15	37.87 6
30.4	21.496	61	4.08 58	27.554	71	51.84 124	5.426	67	16.33 105	47.227	61	37.82 5
Feb. 9.3	21.394	102	3.59 49	27.444	110	52.88 104	5.321	105	17.21 88	47.123	104	37.78 4
		133	40		140	79		136	68		138	6
19.3	21.261		3.19 31	27.304		53.67 57	5.185		17.89 50	46.985		37.72 9
Mar. 1.3	21.102	159	2.88 22	27.139	165	54.24 83	5.024	161	18.39 30	46.819	166	37.63 14
11.3	20.929	173	2.66 15	26.961	178	54.57 11	4.849	175	18.69 12	46.638	181	37.49 17
21.2	20.752	177	2.51 6	26.779	182	54.68 15	4.670	179	18.81 7	46.453	185	37.32 21
31.2	20.582	170	2.45 2	26.603	176	54.53 26	4.497	173	18.74 27	46.274	179	37.11 25
		184			160			156			161	
Apr. 10.2	20.428		2.47 12	26.443		54.17 58	4.341		18.47 45	46.113		36.86 24
20.2	20.300	128	2.59 24	26.307	136	53.59 82	4.208	133	18.02 64	45.978	135	36.62 23
30.1	20.203	97	2.83 33	26.204	103	52.77 101	4.108	100	17.38 81	45.879	99	36.39 20
May 10.1	20.146	57	3.16 45	26.137	67	51.76 121	4.045	63	16.57 98	45.820	59	36.19 16
20.1	20.130	16	3.61 57	26.111	26	50.55 137	4.022	23	15.59 114	45.805	15	36.03 8
		28			16			19			31	
30.0	20.158		4.18 68	26.127		49.18 152	4.041		14.45 126	45.836		35.95 0
June 9.0	20.229	71	4.86 77	26.185	58	47.66 162	4.103	62	13.19 137	45.913	77	35.95 8
19.0	20.342	113	5.63 84	26.282	97	46.04 168	4.205	102	11.82 143	46.033	120	36.03 16
29.0	20.493	151	6.47 89	26.419	137	44.36 169	4.344	139	10.39 145	46.194	161	36.19 25
July 8.9	20.677	184	7.36 92	26.591	172	42.67 164	4.518	174	8.94 144	46.391	197	36.44 30
		216			202			205			228	
18.9	20.893		8.28 89	26.793		41.03 156	4.723		7.50 136	46.619		36.74 34
28.9	21.133	240	9.17 85	27.020	227	39.47 141	4.952	229	6.14 123	46.875	256	37.08 37
Aug. 7.9	21.394	261	10.02 75	27.268	248	38.06 120	5.203	251	4.91 107	47.150	275	37.45 36
17.8	21.669	275	10.77 61	27.533	265	36.86 95	5.468	265	3.84 86	47.442	292	37.81 33
27.8	21.955	286	11.38 47	27.809	276	35.91 64	5.745	277	2.98 58	47.747	305	38.14 28
		292			283			284			310	
Sept. 6.8	22.247		11.85 26	28.092		35.27 31	6.029		2.40 30	48.057		38.42 19
16.7	22.542	295	12.11 7	28.378	286	34.96 2	6.315	286	2.10 0	48.371	314	38.61 11
26.7	22.835	293	12.18 13	28.663	285	34.98 89	6.601	286	2.10 31	48.683	312	38.72 4
Oct. 6.7	23.124	289	12.05 35	28.943	280	35.37 73	6.883	282	2.41 62	48.991	308	38.76 5
16.7	23.404	280	11.70 52	29.215	272	36.10 105	7.156	273	3.03 89	49.290	299	38.71 13
		268			259			260			288	
26.6	23.672		11.18 68	29.474		37.15 132	7.416		3.92 115	49.578		38.58 18
Nov. 5.6	23.923	251	10.50 80	29.716	242	38.47 154	7.661	245	5.07 132	49.850	272	38.40 24
15.6	24.154	231	9.70 88	29.935	219	40.01 171	7.883	222	6.39 145	50.099	249	38.16 23
25.6	24.357	203	8.82 92	30.128	193	41.72 181	8.080	197	7.84 154	50.320	221	37.93 22
Dec. 5.5	24.530	173	7.90 92	30.289	161	43.51 178	8.245	165	9.38 155	50.510	190	37.71 20
		137			124			129			151	
15.5	24.667		6.98 88	30.413		45.32 168	8.374		10.93 152	50.661		37.51 16
25.5	24.762	95	6.10 82	30.497	84	47.10 168	8.462	88	12.45 144	50.768	107	37.35 12
35.4	24.814	52	5.28	30.537	40		8.508	46		50.828	60	
Mean Place	19.071		5.91	25.293		46.17	3.119		11.76	44.605		36.75
Sec δ, Tan δ	1.014		+0.166	1.005		-0.104	1.000		-0.022	1.072		+0.386
D _ψ α, D _ω α	+0.07		0.00	+0.06		0.00	+0.06		0.00	+0.07		0.00
D _ψ δ, D _ω δ	+0.1		+1.0	0.0		+1.0	0.0		+1.0	0.0		+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington in Time.	ζ Orionis. Mag. 2.0		α Columbae. Mag. 2.8		ο Aurigae. Mag. 5.5		ζ Leporis. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 36 s	° ' -1 58 "	h m 5 36 s	° ' -34 6 "	h m 5 39 s	° ' +49 47 "	h m 5 43 s	° ' -14 50 "
n. 0.5	39.633 24	67.59 142	43.134 24	65.68 281	36.431 40	33.45 156	16.689 16	68.20 207
10.4	39.657 21	69.01 127	43.110 75	68.49 253	36.471 30	35.01 147	16.705 30	70.27 189
20.4	39.636 64	70.28 109	43.035 122	71.02 220	36.441 99	36.48 132	16.675 74	72.16 164
30.4	39.572 103	71.37 91	42.913 165	73.22 182	36.342 158	37.80 109	16.601 114	73.80 138
b. 9.3	39.469 134	72.28 71	42.748 200	75.04 140	36.184 209	38.89 83	16.487 146	75.18 106
19.3	39.335 160	72.99 52	42.548 224	76.44 96	35.975 248	39.72 54	16.341 173	76.24 76
r. 1.3	39.175 174	73.51 32	42.324 240	77.40 50	35.727 270	40.26 19	16.168 187	77.00 45
11.3	39.001 180	73.83 12	42.084 245	77.90 5	35.457 279	40.45 14	15.981 193	77.45 13
21.2	38.821 174	73.95 7	41.839 238	77.95 40	35.178 270	40.31 47	15.788 175	77.58 18
31.2	38.647 158	73.88 28	41.601 221	77.55 83	34.908 246	39.84 78	15.599 175	77.40 48
or. 10.2	38.489 135	73.60 46	41.380 196	76.72 124	34.662 210	39.06 105	15.424 152	76.92 78
20.2	38.354 104	73.14 66	41.184 162	75.48 162	34.452 162	38.01 129	15.272 121	76.14 106
30.1	38.250 67	72.48 83	41.022 122	73.86 195	34.290 107	36.72 145	15.151 85	75.08 130
ly 10.1	38.183 27	71.65 100	40.900 78	71.91 226	34.183 45	35.27 156	15.066 47	73.78 155
20.1	38.156 14	70.65 116	40.822 30	69.65 251	34.138 18	33.71 162	15.019 4	72.23 175
30.0	38.170 56	69.49 128	40.792 18	67.14 268	34.156 84	32.09 163	15.015 39	70.48 190
ne 9.0	38.226 97	68.21 139	40.810 65	64.46 280	34.240 147	30.46 159	15.054 80	68.58 201
19.0	38.323 135	66.82 145	40.875 112	61.66 285	34.387 204	28.87 138	15.134 119	66.57 208
29.0	38.458 170	65.37 148	40.987 155	58.81 281	34.591 257	27.38 121	15.253 156	64.49 208
ly 8.9	38.628 201	63.89 146	41.142 192	56.00 269	34.848 305	26.00 121	15.409 188	62.41 202
18.9	38.829 225	62.43 138	41.334 228	53.31 249	35.153 345	24.79 105	15.597 216	60.39 190
28.9	39.054 247	61.05 126	41.562 258	50.82 220	35.498 376	23.74 86	15.813 239	58.49 169
ig. 7.9	39.301 264	59.79 107	41.820 281	48.62 185	35.874 404	22.88 64	16.052 259	56.80 145
17.8	39.565 275	58.72 86	42.101 300	46.77 141	36.278 422	22.24 46	16.311 273	55.35 113
27.8	39.840 282	57.86 60	42.401 311	45.36 98	36.700 436	21.78 24	16.584 282	54.22 76
pt. 6.8	40.122 287	57.26 29	42.712 318	44.43 38	37.136 442	21.54 4	16.866 287	53.46 36
16.7	40.409 286	56.97 1	43.030 319	44.05 16	37.578 443	21.50 16	17.153 289	53.10 6
26.7	40.695 282	56.98 34	43.349 313	44.21 73	38.021 438	21.66 35	17.442 286	53.16 48
t. 6.7	40.977 274	57.32 64	43.662 301	44.94 127	38.459 428	22.01 55	17.728 278	53.64 92
16.7	41.251 262	57.96 92	43.963 284	46.21 178	38.887 411	22.56 76	18.006 267	54.56 130
26.6	41.513 247	58.88 117	44.247 260	47.99 223	39.298 386	23.32 93	18.273 249	55.86 165
iv. 5.6	41.760 227	60.05 137	44.507 231	50.22 260	39.684 354	24.25 111	18.522 227	57.51 193
15.6	41.987 199	61.42 151	44.738 196	52.82 287	40.038 314	25.36 127	18.749 199	59.44 214
25.6	42.186 168	62.93 159	44.933 153	55.69 305	40.352 266	26.63 141	18.948 167	61.58 226
x. 5.5	42.354 132	64.52 161	45.086 107	58.74 311	40.618 210	28.04 152	19.115 129	63.84 232
15.5	42.486 94	66.13 158	45.193 58	61.85 306	40.828 145	29.56 158	19.244 87	66.16 229
25.5	42.580 47	67.71 149	45.251 6	64.91 294	40.973 79	31.14 158	19.331 42	68.45 217
35.4	42.627	69.20	45.257	67.85	41.052	32.72	19.373	70.62
Place	37.254	66.44	40.782	62.00	32.753	30.17	14.362	65.86
, Tan δ	1.001	-0.035	1.208	-0.677	1.549	+1.183	1.035	-0.265
, D _α	+0.06	0.00	+0.04	0.00	+0.09	-0.01	+0.05	0.00
, D _δ	0.0	+1.0	0.0	+1.0	0.0	+1.0	0.0	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	κ Orionis. Mag. 2.2			δ Doradus. Mag. 4.5			ν Aurigæ. Mag. 4.2			δ Leporis. Mag. 3.9		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 5 43	s	° ' " - 9 41	h m 5 44	s	° ' " - 65 45	h m 5 45	s	° ' " + 39 7	h m 5 47	s	° ' " - 20 52
Jan. 0.5	54.376	23	54.20	40.69	19	63.22	51.527	51	34.83	49.988	12	69.44
10.4	54.399	—	56.04	40.50	337	66.59	51.578	—	35.80	50.000	—	71.84
20.4	54.376	23	57.69	40.22	28	69.65	51.570	8	36.73	49.966	34	74.01
30.4	54.310	66	59.14	39.86	36	72.33	51.504	66	37.58	49.886	80	75.92
Feb. 9.4	54.204	106	60.34	39.42	44	74.55	51.386	118	38.30	49.766	120	77.51
		139			50			163			155	
19.3	54.065		61.29	38.92		76.27	51.223		38.86	49.611		78.76
Mar. 1.3	53.900	165	61.96	38.38	54	77.45	51.028	195	39.23	49.430	181	79.68
11.3	53.720	180	62.37	37.82	56	78.09	50.809	219	39.36	49.233	197	80.21
21.2	53.533	187	62.50	37.25	57	78.18	50.583	226	39.27	49.029	204	80.38
31.2	53.351	182	62.37	36.68	57	77.72	50.362	221	38.94	48.828	201	80.20
		167			54			202			187	
Apr. 10.2	53.184	146	61.98	36.14		76.75	50.160	173	38.42	48.641		79.67
20.2	53.038	114	61.33	35.65	49	75.29	49.987	134	37.70	48.477	164	78.80
30.1	52.924	80	60.45	35.21	44	73.37	49.853	88	36.82	48.343	134	77.61
May 10.1	52.844	40	59.33	34.83	38	71.05	49.765	36	35.85	48.244	99	76.14
20.1	52.804	1	58.00	34.54	22	68.37	49.729	17	34.80	48.186	16	74.41
30.1	52.805	43	56.49	34.32	12	65.40	49.746	72	33.73	48.170	28	72.45
June 9.0	52.848	85	54.83	34.20	4	62.23	49.818	124	32.66	48.198	70	70.32
19.0	52.933	123	53.06	34.16	6	58.94	49.942	173	31.65	48.268	111	68.07
29.0	53.056	158	51.23	34.22	15	55.59	50.115	218	30.71	48.379	150	65.76
July 8.9	53.214	189	49.39	34.37	24	52.28	50.333	257	29.87	48.529	182	63.45
18.9	53.403	217	47.59	34.61	31	49.12	50.590	280	29.15	48.711	213	61.21
28.9	53.620	239	45.91	34.92	39	46.20	50.879	318	28.55	48.924	239	59.12
Aug. 7.9	53.859	258	44.38	35.31	45	43.62	51.197	330	28.06	49.163	259	57.24
17.8	54.117	271	43.09	35.76	50	41.46	51.536	356	27.70	49.422	275	55.66
27.8	54.388	280	42.06	36.26	54	39.79	51.892	366	27.46	49.697	286	54.42
Sept. 6.8	54.668	286	41.37	36.80	55	38.69	52.258	372	27.32	49.983	293	53.59
16.8	54.954	286	41.03	37.35	57	38.22	52.630	375	27.28	50.276	294	53.19
26.7	55.240	284	41.08	37.92	56	38.39	53.005	371	27.34	50.570	285	53.27
Oct. 6.7	55.524	277	41.50	38.48	53	39.22	53.376	364	27.50	50.863	273	53.83
16.7	55.801	266	42.32	39.01	49	40.70	53.740	348	27.77	51.148	266	54.86
26.6	56.067	248	43.48	39.50	43	42.76	54.088	335	28.13	51.421	254	56.32
Nov. 5.6	56.315	229	44.94	39.93	36	45.36	54.423	307	28.59	51.675	232	58.16
15.6	56.544	202	46.67	40.29	28	48.40	54.730	277	29.15	51.907	203	60.33
25.6	56.746	170	48.57	40.57	19	51.77	55.007	237	29.83	52.110	169	62.74
Dec. 5.5	56.916	133	50.59	40.76	8	55.37	55.244	192	30.61	52.279	130	65.32
15.5	57.049	94	52.64	40.84	2	59.06	55.436	139	31.47	52.409	86	67.95
25.5	57.143	48	54.66	40.82	12	62.73	55.575	83	32.39	52.495	39	70.54
35.5	57.191		56.59	40.70		66.25	55.658		33.36	52.534		73.04
Mean Place	52.031		52.25	37.415		58.66	48.356		32.94	47.663		66.69
Sec δ, Tan δ	1.014		-0.171	2.436		-2.222	1.289		+0.813	1.070		-0.382
D _α α, D _α α	+0.06		0.00	0.00		+0.01	+0.08		0.00	+0.05		0.00
D _δ δ, D _α δ	0.0		+1.0	0.0		+1.0	0.0		+1.0	0.0		+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time	θ Aurigæ. Mag. 2.7		1 Geminorum. Mag. 4.3		1 G. Puppis. Mag. 6.2		ν Orionis. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 54 s	° ' " +37 12 "	h m 5 59 s	° ' " +23 16 "	h m 6 2 s	° ' " -45 1 "	h m 6 2 s	° ' " +14 46 "
Jan. 0.5	10.894 61	30.04 85	10.896 62	7.57 1	9.322 24	73.26 326	56.084 60	44.55 52
10.4	10.955 1	30.89 84	10.958 10	7.56 —	9.298 85	76.52 299	56.094 12	44.03 43
20.4	10.956 55	31.73 78	10.968 40	7.61 9	9.213 142	79.51 265	56.106 37	43.60 35
30.4	10.901 108	32.51 68	10.928 87	7.70 10	9.071 193	82.16 225	56.069 81	43.25 27
Feb. 9.4	10.793 152	33.19 55	10.841 126	7.80 9	8.878 235	84.41 181	55.988 119	42.98 20
19.3	10.641 186	33.74 37	10.715 158	7.89 5	8.643 269	86.22 135	55.869 149	42.78 15
Mar. 1.3	10.455 211	34.11 17	10.557 178	7.94 0	8.374 290	87.57 82	55.720 170	42.63 13
11.3	10.244 219	34.28 3	10.379 188	7.94 6	8.084 300	88.39 33	55.550 179	42.50 9
21.3	10.025 215	34.25 26	10.191 186	7.88 12	7.784 299	88.72 18	55.371 178	42.41 6
31.2	9.810 201	33.99 44	10.005 172	7.76 18	7.485 285	88.54 66	55.193 166	42.35 4
Apr. 10.2	9.609 172	33.55 61	9.833 151	7.58 24	7.200 261	87.88 113	55.027 145	42.31 0
20.2	9.437 135	32.94 77	9.682 118	7.34 25	6.939 228	86.75 156	54.882 115	42.31 4
30.1	9.302 91	32.17 87	9.564 80	7.09 27	6.711 189	85.19 197	54.767 80	42.35 9
May 10.1	9.211 42	31.30 94	9.484 38	6.82 23	6.522 141	83.22 230	54.687 39	42.44 16
20.1	9.169 9	30.36 96	9.446 6	6.59 23	6.381 89	80.92 262	54.648 1	42.60 24
30.1	9.178 62	29.40 96	9.452 52	6.36 18	6.292 38	78.30 284	54.649 44	42.84 30
June 9.0	9.240 112	28.44 92	9.504 95	6.18 12	6.254 17	75.46 301	54.693 87	43.14 37
19.0	9.352 160	27.52 86	9.599 137	6.06 7	6.271 70	72.45 308	54.780 126	43.51 43
29.0	9.512 204	26.66 78	9.736 176	5.99 0	6.341 122	69.37 308	54.906 162	43.94 48
July 9.0	9.716 243	25.88 68	9.912 209	5.99 5	6.463 170	66.29 297	55.068 193	44.42 50
18.9	9.959 275	25.20 58	10.121 238	6.04 8	6.633 215	63.32 280	55.261 222	44.92 50
28.9	10.234 304	24.62 48	10.359 263	6.12 10	6.848 255	60.52 252	55.483 245	45.42 47
Aug. 7.9	10.538 326	24.14 38	10.622 282	6.22 10	7.103 287	58.00 216	55.728 265	45.89 41
17.8	10.864 342	23.76 28	10.904 297	6.32 9	7.390 317	55.84 171	55.993 280	46.30 32
27.8	11.206 355	23.48 18	11.201 309	6.41 5	7.707 337	54.13 120	56.273 290	46.62 20
Sept. 6.8	11.561 362	23.30 12	11.510 315	6.46 1	8.044 354	52.93 64	56.563 298	46.82 7
16.8	11.923 366	23.18 3	11.825 318	6.45 6	8.398 359	52.29 3	56.861 301	46.89 7
26.7	12.289 364	23.15 4	12.143 319	6.39 13	8.757 359	52.26 59	57.162 303	46.82 24
Oct. 6.7	12.653 359	23.19 12	12.462 314	6.26 20	9.116 349	52.85 120	57.465 299	46.58 37
16.7	13.012 347	23.31 22	12.776 304	6.06 25	9.465 334	54.05 177	57.764 291	46.21 51
26.7	13.359 332	23.53 31	13.080 293	5.81 27	9.799 308	55.82 230	58.055 280	45.70 61
Nov. 5.6	13.691 308	23.84 40	13.373 275	5.54 28	10.107 275	58.12 274	58.335 261	45.09 70
15.6	13.999 280	24.24 51	13.648 248	5.26 27	10.382 235	60.86 309	58.596 239	44.39 73
25.6	14.279 242	24.75 61	13.896 217	4.99 22	10.617 186	63.95 332	58.835 209	43.66 74
Dec. 5.5	14.521 198	25.36 72	14.113 180	4.77 18	10.803 132	67.27 345	59.044 173	42.92 70
15.5	14.719 147	26.08 79	14.293 137	4.59 10	10.935 74	70.72 346	59.217 132	42.22 65
25.5	14.866 91	26.87 83	14.430 88	4.49 4	11.009 13	74.18 337	59.349 87	41.57 57
35.5	14.957	27.70	14.518	4.45	11.022	77.55	59.436	41.00
Mean Place	7.777	28.98	8.153	7.80	6.808	69.76	53.437	45.52
Sec δ , Tan δ	1.256	+0.759	1.089	+0.430	1.415	-1.001	1.034	+0.264
$D_{\psi} \alpha$, $D_{\omega} \alpha$	+0.08	0.00	+0.07	0.00	+0.03	0.00	+0.07	0.00
$D_{\psi} \delta$, $D_{\omega} \delta$	0.0	+1.0	0.0	+1.0	0.0	+1.0	0.0	+1.0

APPARENT PLACES OF STARS, 1918.

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FOR THE UPPER TRANSIT AT WASHINGTON.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Geminorum. Mag. 3.2		ψ^1 Aurigæ. Mag. 5.1		β Canis Majoris. Mag. 2.0		δ Monocerotis. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 18 s	° ' " +22 33 "	h m 6 18 s	° ' " +49 19 "	h m 6 19 s	° ' " -17 54 "	h m 6 19 s	° ' " + 4 38 "
Jan. 0.5	2.761 80	23.13 7	38.870 95	51.85 154	7.653 48	54.02 238	27.886 69	5.70 116
10.5	2.841 28	23.06 0	38.965 24	53.39 153	7.701 —	56.40 219	27.955 21	4.54 104
20.4	2.869 —	23.06 6	38.989 49	54.92 146	7.698 3	58.59 196	27.976 —	3.50 90
30.4	2.845 24	23.12 10	38.940 115	56.38 132	7.649 93	60.55 167	27.949 71	2.60 72
Feb. 9.4	2.774 114	23.22 11	38.825 173	57.70 112	7.556 132	62.22 136	27.878 109	1.88 58
19.3	2.660 —	23.33 10	38.652 220	58.82 87	7.424 163	63.58 103	27.769 140	1.30 44
Mar. 1.3	2.512 148	23.43 6	38.432 255	59.69 57	7.261 184	64.61 69	27.629 163	0.86 28
11.3	2.340 172	23.49 2	38.177 272	60.26 25	7.077 196	65.30 36	27.466 175	0.58 15
21.3	2.155 185	23.51 —	37.905 274	60.51 8	6.882 197	65.66 —	27.291 176	0.43 2
31.2	1.968 177	23.47 10	37.631 259	60.43 40	6.685 188	65.69 32	27.115 166	0.41 10
Apr. 10.2	1.791 —	23.37 15	37.372 235	60.03 72	6.497 170	65.37 64	26.949 150	0.51 24
20.2	1.635 128	23.22 18	37.137 196	59.31 98	6.327 146	64.73 93	26.799 123	0.75 36
30.2	1.507 93	23.04 19	36.941 147	58.33 121	6.181 113	63.80 122	26.676 92	1.11 48
May 10.1	1.414 53	22.85 20	36.794 91	57.12 139	6.068 77	62.58 147	26.584 55	1.59 60
20.1	1.361 10	22.65 19	36.703 32	55.73 151	5.991 38	61.11 171	26.529 16	2.19 73
30.1	1.351 —	22.46 15	36.671 29	54.22 159	5.953 2	59.40 188	26.513 25	2.92 82
June 9.0	1.385 77	22.31 12	36.700 90	52.63 163	5.955 44	57.52 203	26.538 64	3.74 90
19.0	1.462 118	22.19 7	36.790 148	51.00 161	5.999 84	55.49 213	26.602 102	4.64 97
29.0	1.580 157	22.12 4	36.938 203	49.39 155	6.083 121	53.36 213	26.704 137	5.61 99
July 9.0	1.737 190	22.08 1	37.141 253	47.84 147	6.204 155	51.23 209	26.841 170	6.60 100
18.9	1.927 —	22.07 2	37.394 296	46.37 135	6.359 186	49.14 200	27.011 197	7.60 95
28.9	2.148 221	22.09 3	37.690 335	45.02 121	6.545 214	47.14 182	27.208 222	8.55 87
Aug. 7.9	2.395 247	22.12 1	38.025 366	43.81 106	6.759 237	45.32 156	27.430 243	9.42 73
17.9	2.663 268	22.13 3	38.391 393	42.75 90	6.996 257	43.76 126	27.673 260	10.15 54
27.8	2.948 298	22.10 7	38.784 413	41.85 72	7.253 271	42.50 89	27.933 272	10.74 31
Sept. 6.8	3.246 —	22.03 13	39.197 428	41.13 54	7.524 283	41.61 49	28.205 282	11.12 1
16.8	3.556 310	21.90 22	39.625 437	40.59 36	7.807 290	41.12 4	28.487 289	11.26 10
26.7	3.872 316	21.68 28	40.062 442	40.23 15	8.097 294	41.08 42	28.776 292	11.16 34
Oct. 6.7	4.190 318	21.40 35	40.504 439	40.08 4	8.391 285	41.50 130	29.068 287	10.80 6
16.7	4.508 313	21.05 40	40.943 431	40.12 26	8.683 285	42.37 130	29.359 287	10.19 8
26.7	4.821 —	20.65 43	41.374 415	40.38 47	8.968 273	43.67 169	29.646 277	9.35 10
Nov. 5.6	5.122 286	20.22 44	41.789 390	40.85 70	9.241 255	45.36 203	29.923 260	8.31 12
15.6	5.408 263	19.78 42	42.179 357	41.55 90	9.496 231	47.39 227	30.183 241	7.11 13
25.6	5.671 235	19.36 37	42.536 315	42.45 110	9.727 199	49.66 244	30.424 212	5.80 13
Dec. 5.6	5.906 198	18.99 30	42.851 263	43.55 128	9.926 163	52.10 254	30.636 178	4.44 13
15.5	6.104 —	18.69 20	43.114 202	44.83 142	10.089 120	54.64 254	30.814 140	3.07 13
25.5	6.259 155	18.49 12	43.316 135	46.25 150	10.209 74	57.18 246	30.954 94	1.75 12
35.5	6.367 108	18.37 —	43.451 —	47.75 —	10.283 —	59.64 —	31.048 —	0.52 —
Mean Place	0.017	24.62	35.164	52.40	5.296	51.34	25.405	7.86
Sec δ , Tan δ	1.083	+0.415	1.534	+1.164	1.051	-0.323	1.003	+0.081
$D_{\psi} a$, $D_{\omega} a$	+0.07	0.00	+0.09	+0.01	+0.05	0.00	+0.06	0.00
$D_{\psi} \delta$, $D_{\omega} \delta$	0.0	+1.0	0.0	+1.0	0.0	+1.0	0.0	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Argus. (Canopus.) Mag. -0.9		10 Monocerotis. Mag. 5.0		γ Geminorum. Mag. 4.1		δ Lyncis. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 22 s	° ' " -52 38 "	h m 6 23 s	° ' " - 4 42 "	h m 6 24 s	° ' " +20 15 "	h m 6 30 s	° ' " +61 33 "
Jan. 0.5	10.608	64.81	57.089	40.11	8.368	52.69	16.89	16.58
10.5	10.587 21	68.31 350	57.154 65	41.84 173	8.453 85	52.46 23	17.01 12	18.74 216
20.4	10.494 93	71.61 330	57.172 18	43.39 155	8.486 33	52.32 14	17.04 3	20.88 214
30.4	10.334 160	74.58 297	57.142 30	44.77 138	8.468 18	52.26 6	16.97 7	22.93 205
Feb. 9.4	10.113 221	77.16 258	57.069 73	45.93 116	8.403 65	52.26 0	16.80 17	24.81 188
	273	214	112	94	108	4	24	160
19.4	9.840	79.30	56.957	46.87	8.295	52.30	16.56	26.41
Mar. 1.3	9.526 314	80.96 166	56.814 143	47.57 70	8.153 142	52.35 5	16.26 30	27.68 127
11.3	9.183 343	82.11 115	56.648 166	48.05 48	7.985 168	52.39 4	15.90 36	28.56 88
21.3	8.825 358	82.74 63	56.471 177	48.30 25	7.804 181	52.41 2	15.52 38	29.03 47
31.2	8.464 361	82.84 10	56.291 180	48.33 3	7.621 183	52.40 1	15.13 39	29.06 3
	350	42	173	19	176	4	38	42
Apr. 10.2	8.114	82.42	56.118	48.14	7.445	52.36	14.75	28.64
20.2	7.785 329	81.50 92	55.964 154	47.75 39	7.289 156	52.29 7	14.40 35	27.81 83
30.2	7.489 296	80.11 139	55.834 130	47.15 60	7.160 129	52.20 9	14.10 30	26.60 121
May 10.1	7.235 254	78.28 183	55.734 100	46.35 80	7.063 97	52.10 10	13.87 23	25.07 153
20.1	7.029 206	76.05 223	55.670 64	45.38 97	7.006 57	52.01 9	13.70 17	23.27 180
	151	256	26	115	15	6	10	201
30.1	6.878	73.49	55.644	44.23	6.991	51.95	13.60	21.26
June 9.1	6.787 91	70.66 283	55.658 14	42.96 127	7.018 27	51.92 3	13.59 1	19.09 217
19.0	6.755 32	67.62 304	55.711 53	41.58 138	7.087 69	51.92 0	13.66 7	16.86 223
29.0	6.783 28	64.47 315	55.801 90	40.12 146	7.197 110	51.96 4	13.81 15	14.61 225
July 9.0	6.873 90	61.28 319	55.927 126	38.63 149	7.345 148	52.04 8	14.04 23	12.39 222
	148	313	159	147	181	10	30	212
18.9	7.021	58.15	56.086	37.16	7.526	52.14	14.34	10.27
28.9	7.223 202	55.18 297	56.273 187	35.75 141	7.739 213	52.25 11	14.70 36	8.27 200
Aug. 7.9	7.475 252	52.47 271	56.486 213	34.47 128	7.976 237	52.36 11	15.12 42	6.44 183
17.9	7.773 298	50.09 238	56.720 284	33.38 109	8.236 260	52.43 7	15.58 46	4.82 162
27.8	8.109 336	48.15 194	56.972 252	32.50 88	8.513 277	52.45 2	16.09 51	3.42 140
	367	142	266	59	292	5	54	113
Sept. 6.8	8.476	46.73	57.238	31.91	8.805	52.40	16.63	2.29
16.8	8.866 390	45.88 85	57.515 277	31.62 29	9.108 303	52.27 13	17.19 56	1.41 88
26.8	9.271 405	45.64 24	57.800 285	31.66 4	9.417 309	52.03 24	17.77 58	0.84 57
Oct. 6.7	9.681 410	46.05 41	58.088 288	32.05 39	9.731 314	51.70 33	18.36 59	0.56 28
16.7	10.085 404	47.09 104	58.376 288	32.78 73	10.044 313	51.28 42	18.94 58	0.59 3
	389	166	284	105	309	49	58	36
26.7	10.474	48.75	58.660	33.83	10.353	50.79	19.52	0.95
Nov. 5.6	10.836 362	50.97 222	58.933 273	35.16 133	10.652 299	50.24 55	20.08 56	1.63 68
15.6	11.164 328	53.70 273	59.191 258	36.73 157	10.938 286	49.67 57	20.61 53	2.62 99
25.6	11.443 279	56.83 313	59.429 238	38.47 174	11.201 263	49.10 57	21.09 48	3.92 130
Dec. 5.6	11.668 225	60.25 342	59.638 209	40.32 185	11.437 236	48.57 53	21.51 42	5.50 158
	163	359	175	190	200	47	35	182
15.5	11.831	63.84	59.813	42.22	11.637	48.10	21.86	7.32
25.5	11.924 93	67.50 366	59.948 135	44.09 187	11.796 159	47.72 38	22.12 26	9.33 201
35.5	11.946 22	71.10 360	60.041 93	45.89 180	11.908 112	47.43 29	22.30 18	11.46 213
Mean Place	7.897	61.97	54.682	37.61	5.668	54.64	12.096	17.93
Sec δ , Tan δ	1.648	-1.310	1.003	-0.082	1.066	+0.369	2.099	+1.846
D δ α , D ∞ α	+0.03	-0.01	+0.06	0.00	+0.07	0.00	+0.11	+0.02
D δ δ , D ∞ δ	0.0	+1.0	0.0	+1.0	0.0	+1.0	-0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ϵ^2 Canis Majoris. Mag. 4.5			δ H. Camelop. Mag. 5.6			γ Geminorum. Mag. 1.9			δ Aurigæ. Mag. 5.7		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 6 31	s	° ' "	h m 6 32	s	° ' "	h m 6 32	s	° ' "	h m 6 32	s	° ' "
			-22 53			+79 39			+16 28			+39 27
Jan. 0.5	39.565	54	57.29	27.06	19	21.37	61.166	91	10.62	61.917	108	49.65
10.5	39.619	4	59.95	27.25	7	24.28	61.257	41	10.13	62.025	45	50.59
20.4	39.623	46	62.41	27.18	30	27.15	61.298	11	9.75	62.070	16	51.58
30.4	39.577	93	64.63	26.88	54	29.86	61.287	58	9.49	62.054	75	52.58
Feb. 9.4	39.484	133	66.56	26.34	73	32.30	61.229	100	9.31	61.979	128	53.52
19.4	39.351	166	68.15	25.61	90	34.39	61.129	135	9.20	61.851	171	54.37
Mar. 1.3	39.185	190	69.39	24.71	103	36.04	60.994	161	9.14	61.680	204	55.05
11.3	38.995	203	70.25	23.68	110	37.18	60.833	176	9.12	61.476	221	55.56
21.3	38.792	207	70.75	22.58	112	37.77	60.657	180	9.12	61.255	226	55.84
31.2	38.585	200	70.85	21.46	109	37.78	60.477	173	9.13	61.029	218	55.89
Apr. 10.2	38.385	134	70.60	20.37	101	37.23	60.304	155	9.15	60.811	199	55.70
20.2	38.201	160	69.99	19.36	91	36.15	60.149	131	9.17	60.612	167	55.30
30.2	38.041	130	69.04	18.45	76	34.58	60.018	100	9.20	60.445	128	54.71
May 10.1	37.911	95	67.77	17.69	58	32.57	59.918	62	9.26	60.317	83	53.93
20.1	37.816	55	66.21	17.11	39	30.21	59.856	23	9.34	60.234	34	53.02
30.1	37.761	15	64.40	16.72	17	27.56	59.833	19	9.47	60.200	17	52.01
June 9.1	37.746	26	62.38	16.55	3	24.72	59.852	59	9.63	60.217	68	50.94
19.0	37.772	67	60.19	16.58	24	21.77	59.911	98	9.84	60.285	117	49.84
29.0	37.839	105	57.90	16.82	45	18.78	60.009	136	10.10	60.402	164	48.74
July 9.0	37.944	141	55.58	17.27	63	15.83	60.145	169	10.37	60.566	205	47.67
18.9	38.085	175	53.29	17.90	83	12.98	60.314	199	10.65	60.771	243	46.64
28.9	38.260	204	51.11	18.73	98	10.31	60.513	225	10.93	61.014	275	45.67
Aug. 7.9	38.464	230	49.10	19.71	111	7.86	60.738	247	11.16	61.289	304	44.78
17.9	38.694	253	47.36	20.82	124	5.70	60.985	266	11.35	61.593	327	43.97
27.8	38.947	270	45.93	22.06	134	3.86	61.251	280	11.46	61.920	346	43.24
Sept. 6.8	39.217	285	44.90	23.40	141	2.37	61.531	293	11.46	62.266	360	42.59
16.8	39.502	294	44.30	24.81	146	1.27	61.824	301	11.34	62.626	371	42.03
26.8	39.796	300	44.17	26.27	148	0.59	62.125	307	11.07	62.997	377	41.56
Oct. 6.7	40.096	300	44.54	27.75	147	0.33	62.432	308	10.68	63.374	379	41.19
16.7	40.396	295	45.41	29.22	145	0.51	62.740	304	10.16	63.753	375	40.94
26.7	40.691	284	46.74	30.67	136	1.14	63.044	298	9.52	64.128	365	40.80
Nov. 5.6	40.975	268	48.51	32.03	128	2.21	63.342	284	8.78	64.493	348	40.79
15.6	41.241	244	50.66	33.31	115	3.70	63.626	264	8.00	64.841	323	40.93
25.6	41.485	211	53.09	34.46	99	5.58	63.890	238	7.20	65.164	289	41.24
Dec. 5.6	41.696	173	55.75	35.45	79	7.83	64.128	204	6.42	65.453	247	41.71
15.5	41.869	130	58.51	36.24	57	10.38	64.332	163	5.70	65.700	198	42.33
25.5	41.999	82	61.31	36.81	33	13.13	64.495	119	5.05	65.898	140	43.11
35.5	42.081		64.04	37.14		16.01	64.614		4.50	66.038		44.00
Mean Place	37.202		54.58	15.866		22.49	58.530		13.15	58.694		51.81
Sec δ , Tan δ	1.086		-0.422	5.569		+5.479	1.043		+0.296	1.295		+0.823
$D_{\delta} a$, $D_{\alpha} a$	+0.05		0.00	+0.20		+0.05	+0.07		0.00	+0.08		+0.01
$D_{\delta} \delta$, $D_{\alpha} \delta$	-0.1		+1.0	-0.1		+1.0	-0.1		+1.0	-0.1		+1.0

FOR THE UPPER TRANSIT AT

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Pictoris. Mag. 3.3		θ Geminorum. Mag. 3.6		τ Argus. Mag. 2.8		λ Lynceis. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 47	° ' " -61 50	h m 6 47	° ' " +34 3	h m 6 47	° ' " -50 30	h m 6 50	° ' " +58 31
n. 0.5	24.21	73.32	26.233	37.44	56.738	62.45	15.434	51.10
10.5	24.20	77.05	26.353	38.02	56.765	66.05	15.591	53.08
20.5	24.08	80.60	26.415	38.69	56.721	69.47	15.660	55.10
30.4	23.89	83.89	26.417	39.42	56.609	72.62	15.636	57.09
b. 9.4	23.61	86.83	26.362	40.15	56.436	75.44	15.525	58.96
19.4	23.27	89.35	26.257	40.82	56.207	77.84	15.336	60.62
r. 1.3	22.87	91.41	26.109	41.42	55.934	79.79	15.082	62.02
11.3	22.43	92.97	25.929	41.91	55.627	81.25	14.777	63.06
21.3	21.96	94.00	25.729	42.23	55.299	82.21	14.440	63.72
31.3	21.48	94.48	25.521	42.37	54.963	82.64	14.090	63.98
r. 10.2	21.01	94.43	25.317	42.34	54.630	82.57	13.744	63.83
20.2	20.55	93.87	25.129	42.12	54.313	81.99	13.420	63.27
30.2	20.13	92.79	24.968	41.76	54.022	80.93	13.134	62.34
y 10.2	19.75	91.24	24.842	41.25	53.766	79.41	12.900	61.06
20.1	19.42	89.24	24.756	40.63	53.553	77.48	12.725	59.50
30.1	19.15	86.87	24.714	39.91	53.388	75.19	12.619	57.72
ne 9.1	18.95	84.16	24.718	39.14	53.275	72.58	12.584	55.76
19.0	18.83	81.19	24.769	38.33	53.218	69.74	12.623	53.67
29.0	18.79	78.04	24.866	37.52	53.218	66.72	12.732	51.54
ly 9.0	18.82	74.81	25.004	36.71	53.273	63.63	12.911	49.40
19.0	18.93	71.58	25.182	35.92	53.386	60.56	13.155	47.31
28.9	19.10	68.46	25.397	35.16	53.550	57.58	13.458	45.30
ig. 7.9	19.35	65.53	25.643	34.43	53.765	54.79	13.815	43.41
17.9	19.67	62.91	25.915	33.74	54.026	52.31	14.218	41.68
27.9	20.04	60.69	26.212	33.08	54.327	50.22	14.661	40.15
pt. 6.8	20.47	58.95	26.527	32.45	54.662	48.60	15.138	38.81
16.8	20.94	57.76	26.858	31.85	55.026	47.52	15.643	37.72
26.8	21.43	57.19	27.202	31.29	55.409	47.04	16.166	36.87
t. 6.7	21.94	57.28	27.555	30.77	55.804	47.18	16.704	36.30
16.7	22.45	58.02	27.911	30.30	56.201	47.96	17.247	36.02
26.7	22.94	59.42	28.267	29.90	56.591	49.38	17.786	36.03
iv. 5.7	23.41	61.43	28.615	29.59	56.964	51.38	18.314	36.36
15.6	23.83	63.99	28.951	29.40	57.307	53.91	18.817	37.01
25.6	24.20	67.01	29.266	29.33	57.612	56.88	19.286	37.97
ic. 5.6	24.50	70.40	29.553	29.40	57.869	60.18	19.705	39.22
15.6	24.72	74.03	29.801	29.63	58.070	63.73	20.065	40.75
25.5	24.86	77.79	30.004	30.01	58.205	67.38	20.353	42.50
35.5	24.90	81.56	30.155	30.52	58.274	71.04	20.559	44.41
Place	21.093	71.78	23.203	40.85	54.073	60.59	11.009	54.66
, Tan δ	2.120	-1.869	1.207	+0.676	1.573	-1.214	1.916	+1.634
, D_{α}	+0.01	-0.03	+0.08	+0.01	+0.03	-0.02	+0.10	+0.02
, D_{δ}	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0

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FOR THE UPPER TRANSIT AT WASHINGTON.

SM 3

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ^2 Volantis. Mag. 3.9		λ Geminorum. Mag. 3.6		π Argus. Mag. 2.7		δ Geminorum. Mag. 3.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 9	° ' -70 21	h m 7 13	° ' +16 41	h m 7 14	° ' -36 56	h m 7 15	° ' +22 7
	s	"	s	"	s	"	s	"
Jan. 0.5	30.63	57.71	25.538	16.69	17.231	60.97	16.381	58.76
10.5	30.63 0	61.53 382	25.669 131	16.10 59	17.317 86	64.31 334	16.519 138	58.51 25
20.5	30.49 14	65.24 371	25.749 80	15.66 44	17.344 27	67.51 320	16.604 85	58.41 10
30.4	30.23 26	68.74 350	25.777 28	15.36 30	17.314 30	70.49 298	16.636 82	58.44 3
Feb. 9.4	29.86 37	71.93 319	25.753 24	15.20 16	17.229 85	73.18 209	16.614 22	58.57 13
	47	284	70	7	135	234	71	21
19.4	29.39	74.77	25.683	15.13	17.094	75.52	16.543	58.78
Mar. 1.4	28.83 56	77.17 240	25.572 111	15.15 2	16.917 177	77.46 194	16.431 112	59.04 26
11.3	28.22 61	79.09 192	25.430 142	15.23 8	16.707 210	78.98 152	16.286 145	59.30 26
21.3	27.56 66	80.49 140	25.268 164	15.34 11	16.475 232	80.05 107	16.117 169	59.54 24
31.3	26.88 68	81.38 89	25.092 174	15.47 13	16.231 244	80.67 62	15.937 180	59.74 20
	69	35	175	13	245	17	181	15
Apr. 10.3	26.19	81.73	24.917	15.60	15.986	80.84	15.756	59.89
20.2	25.51 68	81.54 19	24.753 164	15.72 12	15.750 236	80.55 29	15.586 170	59.98
30.2	24.87 64	80.84 70	24.606 147	15.84 12	15.533 217	79.83 72	15.434 152	60.01 3
May 10.2	24.27 60	79.62 122	24.485 121	15.95 11	15.340 193	78.69 114	15.309 125	59.98 3
20.1	23.74 53	77.94 168	24.396 89	16.07 12	15.180 160	77.17 152	15.216 93	59.91 7
	45	211	52	12	123	187	56	11
30.1	23.29	75.83	24.344	16.19	15.057	75.30	15.160	59.80
June 9.1	22.92 37	73.35 248	24.328 16	16.32 13	14.975 82	73.14 216	15.143 17	59.66 14
19.1	22.65 27	70.57 278	24.351 23	16.46 14	14.934 41	70.73 241	15.165 22	59.51 15
29.0	22.48 17	67.55 302	24.412 61	16.60 14	14.937 3	68.13 260	15.226 61	59.34 17
July 9.0	22.41 7	64.39 316	24.507 95	16.75 15	14.983 46	65.43 270	15.324 98	59.16 18
	5	322	131	13	90	272	134	19
19.0	22.46	61.17	24.638	16.88	15.073	62.71	15.458	58.97
29.0	22.61 15	57.99 318	24.801 163	16.98 10	15.203 130	60.05 266	15.625 167	58.74 23
Aug. 7.9	22.87 26	54.97 302	24.990 189	17.04 6	15.372 169	57.54 251	15.820 195	58.49 25
17.9	23.22 35	52.18 279	25.207 217	17.02 2	15.578 206	55.26 228	16.043 223	58.19 30
27.9	23.67 45	49.75 243	25.445 238	16.91 11	15.815 237	53.30 196	16.288 245	57.83 36
	54	200	259	23	268	155	267	43
Sept. 6.8	24.21	47.75	25.704	16.68	16.083	51.75	16.555	57.40
16.8	24.81 60	46.27 148	25.979 275	16.33 35	16.375 292	50.68 107	16.839 284	56.88 52
26.8	25.46 65	45.40 87	26.269 290	15.84 49	16.688 313	50.13 55	17.139 300	56.27 61
Oct. 6.8	26.14 68	45.16 24	26.571 302	15.22 62	17.016 328	50.16 3	17.451 312	55.57 70
16.7	26.84 70	45.59 43	26.881 310	14.45 77	17.352 336	50.76 60	17.771 320	54.81 76
	68	108	313	87	338	117	324	82
26.7	27.52	46.67	27.194	13.58	17.690	51.93	18.095	53.99
Nov. 5.7	28.17 65	48.39 172	27.507 313	12.63 95	18.022 332	53.66 173	18.419 324	53.14 85
15.7	28.77 60	50.70 231	27.812 305	11.62 101	18.339 317	55.89 223	18.736 317	52.30 84
25.6	29.29 52	53.52 282	28.104 292	10.61 101	18.632 293	58.54 265	19.038 302	51.50 80
Dec. 5.6	29.72 43	56.77 325	28.373 269	9.63 98	18.893 261	61.52 298	19.318 280	50.79 71
	33	356	239	90	221	321	249	62
15.6	30.05	60.33	28.612	8.73	19.114	64.73	19.567	50.17
25.5	30.24 19	64.08 375	28.814 202	7.93 80	19.287 173	68.08 335	19.778 211	49.69 48
35.5	30.32 8	67.90 382	28.972 158	7.27 66	19.406 119	71.44 336	19.944 166	49.35 34
Mean Place	26.778	57.60	22.922	21.45	14.799	59.34	13.672	63.88
Sec δ , Tan δ	2.976	-2.803	1.044	+0.300	1.251	-0.752	1.080	+0.407
$D_{\mu a}$, $D_{\omega a}$	-0.01	-0.06	+0.07	+0.01	+0.04	-0.02	+0.07	+0.01
$\mu \delta$, $D_{\omega \delta}$	-0.1	+1.0	-0.1	+0.9	-0.1	+0.9	-0.1	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Volantis. Mag. 4.0		♊ Geminorum. Mag. 3.9		♄ Canis Majoris. Mag. 2.4		Groombridge 1808. Mag. 5.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 16 s 7 16 ° ' " -67 48	h m 7 20 s 7 20 ° ' " +27 57	h m 7 20 s 7 20 ° ' " -29 8	h m 7 22 s 7 22 ° ' " +68 37				
Jan. 0.5	56.50	25.77	40.993	38.05	53.511	34.56	27.63	58.80
10.5	56.52	29.61	41.144	38.15	53.614	37.63	27.90	61.17
20.5	56.43	33.36	41.237	38.41	53.660	40.58	28.05	63.64
30.4	56.24	36.91	41.275	38.78	53.654	43.31	28.07	66.14
Feb. 9.4	55.94	40.19	41.258	39.24	53.595	45.76	27.95	68.55
19.4	55.55	43.09	41.188	39.74	53.488	47.89	27.72	70.76
Mar. 1.4	55.07	45.57	41.074	40.25	53.342	49.66	27.39	72.70
11.3	54.55	47.59	40.925	40.73	53.163	51.05	26.98	74.27
21.3	53.98	49.10	40.749	41.13	52.963	52.03	26.50	75.42
31.3	53.38	50.08	40.561	41.44	52.749	52.60	25.99	76.10
Apr. 10.3	52.78	50.52	40.371	41.62	52.533	52.76	25.47	76.29
20.2	52.19	50.44	40.190	41.68	52.326	52.53	24.97	75.99
30.2	51.62	49.82	40.028	41.63	52.135	51.89	24.50	75.21
May 10.2	51.09	48.70	39.892	41.47	51.967	50.88	24.08	73.99
20.1	50.63	47.10	39.791	41.19	51.828	49.53	23.74	72.37
30.1	50.23	45.06	39.727	40.84	51.724	47.87	23.49	70.42
June 9.1	49.90	42.64	39.702	40.42	51.657	45.94	23.33	68.19
19.1	49.65	39.91	39.719	39.95	51.629	43.78	23.27	65.76
29.0	49.50	36.93	39.777	39.44	51.641	41.47	23.30	63.18
July 9.0	49.43	33.79	39.873	38.91	51.691	39.06	23.44	60.52
19.0	49.48	30.59	40.008	38.35	51.781	36.61	23.67	57.85
29.0	49.61	27.40	40.176	37.77	51.908	34.22	24.00	55.22
Aug. 7.9	49.83	24.36	40.376	37.17	52.069	31.97	24.40	52.69
17.9	50.14	21.54	40.603	36.55	52.261	29.93	24.88	50.31
27.9	50.54	19.07	40.856	35.90	52.483	28.19	25.43	48.12
Sept. 6.8	51.01	17.02	41.131	35.20	52.733	26.81	26.04	46.15
16.8	51.54	15.49	41.426	34.47	53.004	25.87	26.69	44.46
26.8	52.12	14.55	41.737	33.70	53.295	25.41	27.39	43.06
Oct. 6.8	52.74	14.23	42.061	32.91	53.602	25.49	28.13	42.01
16.7	53.36	14.58	42.395	32.11	53.917	26.10	28.88	41.32
26.7	53.98	15.60	42.735	31.31	54.235	27.23	29.63	41.01
Nov. 5.7	54.58	17.25	43.075	30.54	54.551	28.87	30.38	41.11
15.7	55.14	19.50	43.408	29.85	54.855	30.97	31.10	41.62
25.6	55.63	22.28	43.728	29.25	55.141	33.45	31.79	42.53
Dec. 5.6	56.03	25.50	44.024	28.77	55.399	36.23	32.41	43.85
15.6	56.35	29.04	44.288	28.44	55.623	39.22	32.96	45.54
25.5	56.57	32.78	44.514	28.29	55.802	42.32	33.41	47.55
35.5	56.67	36.62	44.692	28.29	55.934	45.43	33.75	49.80
Mean Place	52.938	25.94	38.168	43.81	51.144	32.53	21.784	65.80
Sec δ, Tan δ	2.648	-2.451	1.132	+0.531	1.145	-0.558	2.745	+2.556
D _♌ α, D _♌ δ	0.00	-0.05	+0.07	+0.01	+0.05	-0.01	+0.13	+0.06
D _♊ δ, D _♊ δ	-0.1	+0.9	-0.1	+0.9	-0.1	+0.9	-0.1	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Canis Minoris. Mag. 3.1		ρ Geminorum. Mag. 4.2		σ Argus. Mag. 3.3		α^2 Geminorum. (Castor.) Mag. 2.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 22 s	° ' " + 8 27 "	h m 7 23 s	° ' " +31 56 "	h m 7 26 s	° ' " -43 7 "	h m 7 29 s	° ' " +32 3 "
Jan. 0.5	44.799	15.06	53.299	49.78	40.202	66.19	25.148	64.78
10.5	44.932 133	13.94 112	53.458 150	50.12 34	40.298 96	66.72 353	25.313 165	65.10 32
20.5	45.016 84	12.97 97	53.560 102	50.62 50	40.331 33	73.16 344	25.420 107	65.59 49
30.5	45.049 33	12.16 81	53.601 41	51.23 61	40.300 31	76.40 324	25.467 47	66.20 61
Feb. 9.4	45.032 17	11.53 63	53.586 15	51.93 70	40.208 92	79.34 294	25.457 10	66.90 70
	63	48	69	72	144	261	65	73
19.4	44.969	11.05	53.517	52.65	40.064	81.95	25.392	67.63
Mar. 1.4	44.866 103	10.73 32	53.400 117	53.33 68	39.874 190	84.16 221	25.279 113	68.34 71
11.3	44.732 134	10.55 18	53.245 155	53.96 63	39.646 228	85.92 176	25.127 152	68.99 65
21.3	44.576 156	10.47 8	53.065 180	54.48 52	39.391 255	87.23 131	24.949 178	69.54 55
31.3	44.407 169	10.49 2	52.870 195	54.87 39	39.121 270	88.07 84	24.755 194	69.95 41
	169	11	198	22	274	35	199	25
Apr. 10.3	44.238	10.60	52.672	55.09	38.847	88.42	24.556	70.20
20.2	44.077 161	10.79 19	52.482 190	55.15 6	38.580 267	88.28 14	24.365 191	70.30 10
30.2	43.931 146	11.07 28	52.312 170	55.06 9	38.329 251	87.68 60	24.191 174	70.23 7
May 10.2	43.810 121	11.40 33	52.169 143	54.80 26	38.102 227	86.63 105	24.044 147	69.99 24
20.2	43.717 93	11.79 39	52.060 109	54.41 39	37.907 195	85.16 147	23.931 113	69.62 37
	59	46	71	50	157	185	76	50
30.1	43.658	12.25	51.989	53.91	37.750	83.31	23.855	69.12
June 9.1	43.634 24	12.77 52	51.960 29	53.31 60	37.634 116	81.12 219	23.820 35	68.52 60
19.1	43.646 12	13.32 55	51.974 14	52.64 67	37.563 71	78.65 247	23.828 8	67.83 60
29.0	43.693 47	13.91 59	52.030 56	51.90 74	37.538 25	75.97 268	23.876 48	67.09 74
July 9.0	43.776 83	14.51 60	52.126 96	51.14 76	37.560 22	73.15 282	23.966 90	66.30 79
	115	58	135	79	69	287	129	82
19.0	43.891	15.09	52.261	50.35	37.629	70.28	24.095	65.48
29.0	44.036 145	15.64 55	52.433 172	49.54 81	37.743 114	67.45 283	24.260 165	64.63 85
Aug. 7.9	44.210 174	16.11 47	52.637 204	48.71 83	37.901 158	64.73 272	24.458 198	63.76 87
17.9	44.408 198	16.47 36	52.870 233	47.87 84	38.102 201	62.25 248	24.685 227	62.87 89
27.9	44.631 223	16.69 22	53.131 261	47.03 84	38.340 238	60.09 216	24.941 256	61.98 89
	242	5	283	86	274	177	278	91
Sept. 6.9	44.873	16.74	53.414	46.17	38.614	58.32	25.219	61.07
16.8	45.134 261	16.58 16	53.719 305	45.31 86	38.918 304	57.02 130	25.521 302	60.15 92
26.8	45.410 276	16.22 36	54.041 322	44.45 86	39.246 328	56.27 75	25.839 318	59.23 92
Oct. 6.8	45.699 289	15.65 57	54.377 336	43.60 85	39.595 349	56.10 17	26.173 334	58.32 91
16.7	45.997 298	14.85 80	54.724 347	42.77 83	39.955 360	56.55 45	26.519 346	57.43 89
	305	99	354	78	364	106	354	83
26.7	46.302	13.86	55.078	41.99	40.319	57.61	26.873	56.60
Nov. 5.7	46.605 303	12.69 117	55.432 354	41.30 69	40.678 359	59.25 164	27.227 354	55.84 76
15.7	46.903 298	11.40 129	55.778 346	40.70 60	41.021 343	61.43 218	27.576 349	55.20 64
25.6	47.189 286	10.03 137	56.112 334	40.24 46	41.340 319	64.09 266	27.912 336	54.69 51
Dec. 5.6	47.453 264	8.62 141	56.421 309	39.95 29	41.626 286	67.13 304	28.225 313	54.34 35
	238	138	278	13	242	331	283	15
15.6	47.691	7.24	56.699	39.82	41.868	70.44	28.508	54.19
25.6	47.892 201	5.92 132	56.936 237	39.88 6	42.057 189	73.94 350	28.750 242	54.21 2
35.5	48.051 159	4.73 119	57.125 189	40.14 26	42.190 183	77.49 355	28.943 193	54.43 22
Mean Place	42.305	19.80	50.378	55.95	37.702	65.30	22.235	71.37
Sec δ , Tan δ	1.011	+0.149	1.178	+0.624	1.370	-0.937	1.180	+0.626
$D_{\delta} a$, $D_{\alpha} a$	+0.07	0.00	+0.08	+0.01	+0.05	-0.02	+0.08	+0.02
$D_{\delta} \delta$, $D_{\alpha} \delta$	-0.1	+0.9	-0.1	+0.9	-0.1	+0.9	-0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	26 Lyncis. Mag. 5.7		Groombridge 1874. Mag. 5.6		χ Argus. Mag. 3.6		ω Cancr. Mag. 5.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 48 s	° ' " +47 46 "	h m 7 50 s	° ' " +74 7 "	h m 7 54 s	° ' " -52 45 "	h m 7 55 s	° ' " +25 36 "
n. 0.6	48.370 ²¹⁹	33.15 ¹¹⁸	31.77 ⁴²	70.09 ²⁴⁵	44.342 ¹³²	42.61 ³⁷⁷	61.001 ¹⁸⁴	57.81 ¹⁸
10.5	48.589 ¹⁴⁹	34.33 ¹³⁸	32.19 ²⁶	72.54 ²⁶⁵	44.474 ⁵⁷	46.38 ³⁷⁵	61.185 ¹³¹	57.63 ²
20.5	48.738 ⁷⁷	35.71 ¹⁵⁰	32.45 ⁸	75.19 ²⁷³	44.531 ¹⁶	50.13 ³⁶⁰	61.316 ⁷⁵	57.65 ²⁰
30.5	48.815 ²	37.21 ¹⁵⁷	32.53 ⁸	77.92 ²⁶⁹	44.515 ⁹⁰	53.73 ³³⁸	61.391 ¹⁹	57.85 ³³
b. 9.4	48.817 ⁶⁷	38.78 ¹⁵⁵	32.45 ²⁵	80.61 ²⁵⁴	44.425 ¹⁵⁵	57.11 ³⁰⁶	61.410 ³⁴	58.18 ⁴⁴
19.4	48.750 ¹²⁸	40.33 ¹⁴⁵	32.20 ⁴⁰	83.15 ²³⁰	44.270 ²¹³	60.17 ²⁷⁰	61.376 ⁸³	58.62 ⁵¹
r. 1.4	48.622 ¹⁸¹	41.78 ¹³⁰	31.80 ⁵⁰	85.45 ¹⁹⁵	44.057 ²⁶¹	62.87 ²²⁸	61.293 ¹²²	59.13 ⁵³
11.4	48.441 ²²¹	43.08 ¹⁰⁶	31.30 ⁶⁰	87.40 ¹⁵³	43.796 ²⁹⁸	65.15 ¹⁸¹	61.171 ¹⁵³	59.66 ⁵¹
21.3	48.220 ²⁴⁵	44.14 ⁷⁹	30.70 ⁶⁷	88.93 ¹⁰⁵	43.498 ³²¹	66.98 ¹³⁴	61.018 ¹⁷¹	60.17 ⁴⁵
31.3	47.975 ²⁵⁶	44.93 ⁵⁰	30.03 ⁷⁰	89.98 ⁵⁴	43.177 ³³³	68.30 ⁸²	60.847 ¹⁸⁰	60.62 ³⁸
r. 10.3	47.719 ²⁵³	45.43 ¹⁶	29.33 ⁷¹	90.52 ¹	42.844 ³³⁴	69.12 ³⁰	60.667 ¹⁷⁸	61.00 ²⁶
20.3	47.466 ²³⁷	45.59 ¹⁵	28.62 ⁶⁷	90.51 ⁵²	42.510 ³²⁴	69.42 ²⁰	60.489 ¹⁶⁵	61.26 ¹⁶
30.2	47.229 ²¹⁰	45.44 ⁴⁵	27.95 ⁶²	89.99 ¹⁰²	42.186 ³⁰²	69.22 ⁷⁰	60.324 ¹⁴⁶	61.42 ⁵
ay 10.2	47.019 ¹⁷³	44.99 ⁷⁷	27.33 ⁵⁴	88.97 ¹⁴⁸	41.884 ²⁷²	68.52 ¹¹⁸	60.178 ¹¹⁸	61.47 ⁵
20.2	46.846 ¹²⁹	44.22 ¹⁰²	26.79 ⁴⁴	87.49 ¹⁸⁸	41.612 ²³⁷	67.34 ¹⁶³	60.060 ⁸⁶	61.42 ¹⁵
30.1	46.717 ⁸¹	43.20 ¹²⁴	26.35 ³²	85.61 ²²⁴	41.375 ¹⁹⁵	65.71 ²⁰²	59.974 ⁵³	61.27 ²⁶
ne 9.1	46.636 ³¹	41.96 ¹⁴³	26.03 ²¹	83.37 ²⁵²	41.180 ¹⁴⁶	63.69 ²³⁶	59.921 ¹⁵	61.01 ³²
19.1	46.605 ²¹	40.53 ¹⁵⁷	25.82 ⁸	80.85 ²⁷³	41.034 ⁹⁴	61.33 ²⁶⁶	59.906 ²³	60.69 ³⁸
29.1	46.626 ⁷³	38.96 ¹⁶⁸	25.74 ⁵	78.12 ²⁸⁷	40.940 ⁴¹	58.67 ²⁸⁵	59.929 ⁶⁰	60.31 ⁴⁵
ly 9.0	46.699 ¹²²	37.28 ¹⁷⁵	25.79 ¹⁹	75.25 ²⁶⁵	40.899 ¹⁵	55.82 ²⁹⁸	59.989 ⁹⁴	59.86 ⁵¹
19.0	46.821 ¹⁶⁹	35.53 ¹⁷⁹	25.98 ³⁰	72.30 ²⁹⁶	40.914 ⁷⁰	52.84 ³⁰¹	60.083 ¹²⁹	59.35 ⁵⁶
29.0	46.990 ²¹³	33.74 ¹⁷⁸	26.28 ⁴²	69.34 ²⁹¹	40.984 ¹²⁷	49.83 ²⁹⁵	60.212 ¹⁶¹	58.79 ⁶²
ig. 8.0	47.203 ²⁵³	31.96 ¹⁷⁷	26.70 ⁵²	66.43 ²⁸⁰	41.111 ¹⁸¹	46.88 ²⁷⁸	60.373 ¹⁹⁰	58.17 ⁶⁹
17.9	47.456 ²⁹⁰	30.19 ¹⁷³	27.22 ⁶⁴	63.63 ²⁶²	41.292 ²³³	44.10 ²⁵¹	60.563 ²¹⁷	57.48 ⁷⁵
27.9	47.746 ³²³	28.46 ¹⁶⁵	27.86 ⁷²	61.01 ²⁴²	41.525 ²⁸¹	41.59 ²¹⁵	60.780 ²⁴²	56.73 ⁸²
pt. 6.9	48.069 ³⁵⁴	26.81 ¹⁵⁵	28.58 ⁸⁰	58.59 ²¹⁵	41.806 ³²⁶	39.44 ¹⁶⁸	61.022 ²⁶⁶	55.91 ⁹⁰
16.8	48.423 ³⁸⁰	25.26 ¹⁴⁴	29.38 ⁸⁷	56.44 ¹⁸⁴	42.132 ³⁶⁴	37.76 ¹¹⁶	61.288 ²⁸⁷	55.01 ⁹⁶
26.8	48.803 ⁴⁰³	23.82 ¹²⁹	30.25 ⁹²	54.60 ¹⁴⁹	42.496 ³⁹⁴	36.60 ⁵⁷	61.575 ³⁰⁶	54.05 ¹⁰³
t. 6.8	49.206 ⁴²¹	22.53 ¹¹⁰	31.17 ⁹⁶	53.11 ¹¹⁰	42.890 ⁴¹⁵	36.03 ⁷	61.881 ³²⁰	53.02 ¹⁰⁸
16.8	49.627 ⁴³²	21.43 ⁹¹	32.13 ⁹⁸	52.01 ⁶⁸	43.305 ⁴²⁷	36.10 ⁷⁰	62.201 ³³²	51.94 ¹⁰⁹
26.7	50.059 ⁴³⁷	20.52 ⁶⁷	33.11 ⁹⁸	51.33 ²⁴	43.732 ⁴²⁶	36.80 ¹³⁵	62.533 ³³⁹	50.85 ¹⁰⁹
rv. 5.7	50.496 ⁴³³	19.85 ⁴¹	34.09 ⁹⁶	51.09 ²³	44.158 ⁴¹⁴	38.15 ¹⁹⁵	62.872 ³³⁹	49.76 ¹⁰⁵
15.7	50.929 ⁴²¹	19.44 ¹²	35.05 ⁹²	51.32 ⁷⁰	44.572 ³⁸⁹	40.10 ²⁴⁸	63.211 ³³⁰	48.71 ⁹⁶
25.7	51.350 ³⁹⁴	19.32 ¹⁸	35.97 ⁸⁶	52.02 ¹¹⁶	44.961 ³⁵¹	42.58 ²⁹⁷	63.541 ³¹⁴	47.75 ⁸³
xc. 5.6	51.744 ³⁶⁰	19.50 ⁴⁸	36.83 ⁷⁶	53.18 ¹⁶⁰	45.312 ³⁰³	45.55 ³³²	63.855 ²⁸⁹	46.92 ⁶⁸
15.6	52.104 ³¹²	19.98 ⁷⁸	37.59 ⁶⁴	54.78 ¹⁹⁹	45.615 ²⁴³	48.87 ³⁵⁹	64.144 ²⁵³	46.24 ⁴⁹
25.6	52.416 ²⁵⁶	20.76 ¹⁰⁶	38.23 ⁵¹	56.77 ²³¹	45.858 ¹⁷⁵	52.46 ³⁷³	64.397 ²¹¹	45.75 ²⁸
35.5	52.672	21.82	38.74	59.08	46.033	56.19	64.608	45.47
1 Place	44.914	42.22	24.529	80.17	41.669	43.54	58.308	65.73
3, Tan δ	1.488	+1.102	3.658	+3.518	1.653	-1.316	1.109	+0.479
, D _α α	+0.09	+0.03	+0.14	+0.11	+0.03	-0.04	+0.07	+0.02
, D _α δ	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	χ Geminorum. Mag. 5.0		87 Lynceis. Mag. 4.9		ρ Argus. Mag. 2.9		3 H. Ursae Ma Mag. 5.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	De t
	h m 7 58 s	° ' " +28 1 "	h m 8 2 s	° ' " +51 44 "	h m 8 4 s	° ' " -24 3 "	h m 8 4 s	+
Jan. 0.6	31.868	22.35	21.556	29.09	5.382	63.52	45.81	50
10.5	32.059 ¹⁹¹	22.31 ⁴	21.807 ²⁵¹	30.42 ¹³³	5.534 ¹⁵²	66.47 ²⁹⁵	46.19 ³⁸	52
20.5	32.194 ¹³⁵	22.47 ¹⁶	21.983 ¹⁷⁶	31.97 ¹⁵⁵	5.635 ¹⁰¹	69.33 ²⁸⁶	46.43 ²⁴	54
30.5	32.272 ⁷⁸	22.81 ³⁴	22.080 ⁹⁷	33.69 ¹⁷²	5.682 ⁴⁷	72.02 ²⁶⁹	46.56 ¹³	57
Feb. 9.5	32.293 ²¹	23.29 ⁴⁸	22.098 ¹⁸	35.48 ¹⁷⁹	5.677 ⁵	74.47 ²⁴⁵	46.55 ¹	59
19.4	32.260 ³³	23.86 ⁵⁷	22.039 ⁵⁹	37.26 ¹⁷⁸	5.622 ⁵⁵	76.64 ²¹⁷	46.42 ¹³	62
Mar. 1.4	32.177 ⁸³	24.49 ⁶³	21.911 ¹²⁸	38.93 ¹⁶⁷	5.523 ⁹⁹	78.51 ¹⁸⁷	46.16 ²⁶	64
11.4	32.053 ¹²⁴	25.12 ⁶³	21.726 ¹⁸⁵	40.45 ¹⁵²	5.388 ¹³⁵	80.03 ¹⁵²	45.82 ³⁴	66
21.3	31.898 ¹⁵⁵	25.72 ⁶⁰	21.494 ²³²	41.72 ¹²⁷	5.225 ¹⁶³	81.19 ¹¹⁶	45.40 ⁴²	67
31.3	31.724 ¹⁷⁴	26.23 ⁵¹	21.231 ²⁶³	42.71 ⁹⁹	5.044 ¹⁸¹	81.99 ⁸⁰	44.92 ⁴⁸	69
Apr. 10.3	31.540 ¹⁸⁴	26.64 ⁴¹	20.953 ²⁷⁸	43.35 ⁶⁴	4.853 ¹⁹¹	82.43 ⁴⁴	44.41 ⁵¹	69
20.3	31.358 ¹⁸²	26.92 ²⁸	20.674 ²⁷⁹	43.63 ²⁸	4.663 ¹⁹⁰	82.49 ⁶	43.90 ⁵¹	70
30.2	31.188 ¹⁷⁰	27.07 ¹⁵	20.410 ²⁶⁴	43.56 ⁷	4.482 ¹⁸¹	82.20 ²⁹	43.40 ⁵⁰	69
May 10.2	31.038 ¹⁵⁰	27.09 ²	20.170 ²⁴⁰	43.13 ⁴³	4.318 ¹⁶⁴	81.57 ⁶³	42.94 ⁴⁶	69
20.2	30.916 ¹²²	26.98 ¹¹	19.966 ²⁰⁴	42.37 ⁷⁶	4.175 ¹⁴³	80.61 ⁹⁶	42.53 ⁴¹	67
30.2	30.824 ⁹²	26.73 ²⁵	19.806 ¹⁶⁰	41.30 ¹⁰⁷	4.060 ¹¹⁵	79.35 ¹²⁶	42.20 ³³	66
June 9.1	30.769 ⁵⁵	26.39 ³⁴	19.696 ¹¹⁰	39.97 ¹³³	3.976 ⁸⁴	77.82 ¹⁵³	41.95 ²⁵	64
19.1	30.751 ¹⁸	25.96 ⁴³	19.638 ⁵⁸	38.41 ¹⁵⁶	3.922 ⁵⁴	76.07 ¹⁷⁵	41.79 ¹⁶	62
29.1	30.771 ²⁰	25.44 ⁵²	19.635 ³	36.68 ¹⁷³	3.904 ¹⁸	74.14 ¹⁹³	41.71 ⁸	59
July 9.0	30.829 ⁵⁸	24.85 ⁵⁹	19.687 ⁵²	34.80 ¹⁸⁸	3.921 ¹⁷	72.09 ²⁰⁵	41.74 ³	56
19.0	30.922 ⁹³	24.20 ⁶⁵	19.793 ¹⁰⁶	32.83 ¹⁹⁷	3.971 ⁵⁰	69.96 ²¹³	41.85 ¹¹	54
29.0	31.050 ¹²⁸	23.48 ⁷²	19.949 ¹⁵⁶	30.80 ²⁰³	4.057 ⁸⁶	67.85 ²¹¹	42.07 ²²	51
Aug. 8.0	31.211 ¹⁶¹	22.71 ⁷⁷	20.154 ²⁰⁵	28.74 ²⁰⁶	4.176 ¹¹⁹	65.82 ²⁰³	42.37 ³⁰	48
17.9	31.401 ¹⁹⁰	21.88 ⁸³	20.404 ²⁵⁰	26.70 ²⁰⁴	4.327 ¹⁵¹	63.94 ¹⁸⁸	42.74 ³⁷	45
27.9	31.621 ²²⁰	21.00 ⁸⁸	20.696 ²⁹²	24.70 ²⁰⁰	4.507 ¹⁸⁰	62.30 ¹⁶⁴	43.20 ⁴⁶	43
Sept. 6.9	31.865 ²⁴⁴	20.06 ⁹⁴	21.026 ³³⁰	22.78 ¹⁹²	4.718 ²¹¹	60.97 ¹³³	43.72 ⁵²	40
16.8	32.135 ²⁷⁰	19.04 ¹⁰²	21.392 ³⁶⁶	20.97 ¹⁸¹	4.956 ²³⁸	60.00 ⁹⁷	44.31 ⁵⁹	38
26.8	32.426 ²⁹¹	17.99 ¹⁰⁵	21.789 ³⁹⁷	19.31 ¹⁶⁶	5.219 ²⁶³	59.46 ⁵⁴	44.95 ⁶⁴	36
Oct. 6.8	32.737 ³¹¹	16.89 ¹¹⁰	22.213 ⁴²⁴	17.81 ¹⁵⁰	5.502 ²⁸³	59.39 ⁷	45.64 ⁶⁹	34
16.8	33.063 ³²⁶	15.77 ¹¹²	22.660 ⁴⁴⁷	16.52 ¹²⁹	5.803 ³⁰¹	59.82 ⁴³	46.37 ⁷³	33
26.7	33.402 ³³⁹	14.66 ¹¹¹	23.122 ⁴⁶²	15.47 ¹⁰⁶	6.116 ³¹³	60.74 ⁹²	47.11 ⁷⁴	32
Nov. 5.7	33.747 ³⁴⁵	13.58 ¹⁰⁸	23.592 ⁴⁷⁰	14.69 ⁷⁸	6.434 ³¹⁸	62.15 ¹⁴¹	47.87 ⁷⁶	32
15.7	34.093 ³⁴⁶	12.57 ¹⁰¹	24.061 ⁴⁶⁹	14.21 ⁴⁸	6.751 ³¹⁷	64.00 ¹⁸⁵	48.62 ⁷⁵	31
25.7	34.432 ³³⁹	11.67 ⁹⁰	24.520 ⁴⁵⁹	14.07 ¹⁴	7.057 ³⁰⁶	66.23 ²²³	49.35 ⁷³	32
Dec. 5.6	34.754 ³²²	10.93 ⁷⁴	24.953 ⁴³³	14.27 ²⁰	7.345 ²⁸⁸	68.77 ²⁵⁴	50.02 ⁶⁷	33
15.6	35.049 ²⁹⁵	10.35 ⁵⁸	25.350 ³⁹⁷	14.80 ⁵³	7.604 ²⁵⁹	71.54 ²⁷⁷	50.64 ⁶²	34
25.6	35.309 ²⁶⁰	9.97 ³⁸	25.699 ³⁴⁹	15.68 ⁸⁸	7.828 ²²⁴	74.45 ²⁰¹	51.18 ⁵⁴	35
35.5	35.526 ²¹⁷	9.82 ¹⁵	25.988 ²⁸⁹	16.86 ¹¹⁸	8.008 ¹⁸⁰	77.40 ²⁹⁵	51.62 ⁴⁴	37
Mean Place	29.129	30.66	17.926	39.61	3.091	61.46	40.251	61
Sec δ, Tan δ	1.133	+0.532	1.614	+1.268	1.095	-0.447	2.755	+2
D _α , D _α α	+0.07	+0.02	+0.09	+0.04	+0.05	-0.02	+0.12	+0
D _δ , D _δ δ	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9	-0.2	+0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Argus. Mag. 2.2		ζ Cancri (mean.) Mag. 4.7		Bradley 1147. Mag. 5.7		20 Puppis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 7 s	° ' " -47 5 "	h m 8 7 s	° ' " +17 53 "	h m 8 9 s	° ' " +76 0 "	h m 8 9 s	° ' " -15 32 "
Jan. 0.6	2.906 ¹⁵²	39.51 ³⁶⁷	33.213 ¹⁸⁵	38.31 ⁷⁰	24.51 ⁵³	20.33 ²⁴²	36.103 ¹⁶²	28.55 ²⁵⁶
10.5	3.058 ⁸⁵	43.18 ³⁶⁶	33.398 ¹³⁵	37.61 ⁵¹	25.04 ³⁴	22.75 ²⁶⁶	36.265 ¹¹³	31.11 ²⁴⁷
20.5	3.143 ¹⁸	46.84 ³⁵²	33.533 ⁸²	37.10 ³¹	25.38 ¹⁶	25.41 ²⁷⁷	36.378 ⁶¹	33.58 ²²⁸
30.5	3.161 ⁴⁹	50.36 ³³²	33.615 ²⁹	36.79 ¹⁴	25.54 ³	28.18 ²⁷⁹	36.439 ¹¹	35.86 ²⁰⁷
Feb. 9.5	3.112 ¹⁰⁹	53.68 ³⁰³	33.644 ²²	36.65 ²	25.51 ²³	30.97 ²⁷⁰	36.450 ³⁸	37.93 ¹⁸¹
19.4	3.003 ¹⁶⁴	56.71 ²⁶⁷	33.622 ⁶⁸	36.67 ¹⁴	25.28 ³⁸	33.67 ²⁴⁷	36.412 ⁸²	39.74 ¹⁵¹
Mar. 1.4	2.839 ²¹⁰	59.38 ²²⁷	33.554 ¹⁰⁷	36.81 ²⁴	24.90 ⁵³	36.14 ²¹⁶	36.330 ¹¹⁸	41.25 ¹²²
11.4	2.629 ²⁴⁴	61.65 ¹⁸³	33.447 ¹³⁷	37.05 ²⁸	24.37 ⁶⁶	38.30 ¹⁷⁵	36.212 ¹⁴⁵	42.47 ⁹²
21.3	2.385 ²⁷⁰	63.48 ¹³⁶	33.310 ¹⁵⁶	37.33 ³²	23.71 ⁷³	40.05 ¹²⁹	36.067 ¹⁶⁴	43.39 ⁶⁰
31.3	2.115 ²⁸¹	64.84 ⁸⁹	33.154 ¹⁶⁸	37.65 ³¹	22.98 ⁷⁹	41.34 ⁷⁸	35.903 ¹⁷²	43.99 ³⁰
Apr. 10.3	1.834 ²⁸⁴	65.73 ³⁹	32.986 ¹⁶⁵	37.96 ²⁹	22.19 ⁸⁰	42.12 ²⁴	35.731 ¹⁷³	44.29 ¹
20.3	1.550 ²⁷⁶	66.12 ¹⁰	32.821 ¹⁵⁷	38.25 ²⁶	21.39 ⁷⁸	42.36 ³⁰	35.558 ¹⁶⁴	44.30 ²⁹
30.2	1.274 ²⁶⁸	66.02 ⁵⁸	32.664 ¹⁴⁰	38.51 ²²	20.61 ⁷⁴	42.06 ⁸³	35.394 ¹⁴⁹	44.01 ⁵⁶
May 10.2	1.016 ²³⁶	65.44 ¹⁰⁶	32.524 ¹¹⁵	38.73 ¹⁸	19.87 ⁶⁵	41.23 ¹³²	35.245 ¹²⁸	43.45 ⁸³
20.2	0.780 ²⁰³	64.39 ¹⁴⁷	32.409 ⁸⁷	38.91 ¹⁴	19.22 ⁵⁶	39.91 ¹⁷⁶	35.117 ¹⁰³	42.62 ¹⁰⁶
30.2	0.577 ¹⁶⁶	62.92 ¹⁸⁶	32.322 ⁵⁶	39.05 ⁹	18.66 ⁴⁵	38.15 ²¹⁵	35.014 ⁷⁴	41.56 ¹²⁸
June 9.1	0.411 ¹²⁶	61.06 ²²¹	32.266 ²²	39.14 ⁶	18.21 ³¹	36.00 ²⁴⁸	34.940 ⁴³	40.28 ¹⁴⁵
19.1	0.285 ⁸³	58.85 ²⁴⁹	32.244 ¹³	39.20 ²	17.90 ¹⁶	33.52 ²⁷²	34.897 ¹⁰	38.83 ¹⁶⁰
29.1	0.202 ³²	56.36 ²⁶⁹	32.257 ⁴⁵	39.22 ²	17.74 ³	30.80 ²⁹¹	34.887 ²³	37.23 ¹⁶⁸
July 9.0	0.170 ¹²	53.67 ²⁸³	32.302 ⁷⁹	39.20 ⁸	17.71 ¹¹	27.89 ³⁰⁴	34.910 ⁵³	35.55 ¹⁷³
19.0	0.182 ⁶¹	50.84 ²⁸⁷	32.381 ¹¹¹	39.12 ¹⁴	17.82 ²⁶	24.85 ³⁰⁹	34.963 ⁸⁶	33.82 ¹⁷¹
29.0	0.243 ¹¹⁰	47.97 ²⁸³	32.492 ¹⁴⁰	38.98 ²¹	18.08 ³⁸	21.76 ³⁰⁶	35.049 ¹¹⁸	32.11 ¹⁶²
Aug. 8.0	0.353 ¹⁵⁷	45.14 ²⁶⁶	32.632 ¹⁶⁹	38.77 ³¹	18.46 ⁵²	18.70 ²⁹⁹	35.167 ¹⁴⁶	30.49 ¹⁴⁹
17.9	0.510 ²⁰⁴	42.48 ²⁴⁴	32.801 ¹⁹⁶	38.46 ⁴²	18.98 ⁶⁴	15.71 ²⁸⁶	35.313 ¹⁷⁵	29.00 ¹²⁷
27.9	0.714 ²⁴⁷	40.04 ²⁰⁹	32.996 ²²¹	38.04 ⁵³	19.62 ⁷⁵	12.85 ²⁶⁵	35.488 ²⁰³	27.73 ¹⁰⁰
Sept. 6.9	0.961 ²⁸⁶	37.95 ¹⁶⁶	33.217 ²⁴⁴	37.51 ⁶⁸	20.37 ⁸⁴	10.20 ²⁴¹	35.691 ²²⁷	26.73 ⁶⁸
16.9	1.247 ³²²	36.29 ¹¹⁵	33.461 ²⁶⁶	36.83 ⁸¹	21.21 ⁹²	7.79 ²¹¹	35.918 ²⁵²	26.05 ²⁸
26.8	1.569 ³⁵³	35.14 ⁵⁸	33.727 ²⁸⁶	36.02 ⁹⁵	22.13 ¹⁰⁰	5.68 ¹⁷⁷	36.170 ²⁷²	25.77 ¹²
Oct. 6.8	1.922 ³⁷⁴	34.56 ³	34.012 ³⁰³	35.07 ¹⁰⁶	23.13 ¹⁰⁵	3.91 ¹³⁹	36.442 ²⁸⁹	25.89 ⁵⁵
16.8	2.296 ³⁸⁸	34.59 ⁶⁴	34.315 ³¹⁵	34.01 ¹¹⁹	24.18 ¹⁰⁹	2.52 ⁹⁶	36.731 ³⁰²	26.44 ⁹⁹
26.7	2.684 ³⁹⁴	35.23 ¹²⁶	34.630 ³²³	32.82 ¹²⁶	25.27 ¹¹⁰	1.56 ⁵⁰	37.033 ³⁰⁹	27.43 ¹³⁸
Nov. 5.7	3.078 ³⁸⁷	36.49 ¹⁸⁷	34.953 ³²⁵	31.56 ¹²⁹	26.37 ¹⁰⁹	1.06 ²	37.342 ³¹⁰	28.81 ¹⁷⁷
15.7	3.465 ³⁶⁹	38.36 ²³⁹	35.278 ³¹⁹	30.27 ¹²⁸	27.46 ¹⁰⁵	1.04 ⁴⁹	37.652 ³⁰¹	30.58 ²⁰⁹
25.7	3.834 ³³⁹	40.75 ²⁸⁴	35.597 ³⁰⁴	28.99 ¹²³	28.51 ⁹⁸	1.53 ⁹⁷	37.953 ²⁸⁷	32.67 ²³³
Dec. 5.6	4.173 ²⁹⁸	43.59 ³²¹	35.901 ²⁸³	27.76 ¹¹¹	29.49 ⁹⁰	2.50 ¹⁴⁴	38.240 ²⁶¹	35.00 ²⁵⁰
15.6	4.471 ²⁴⁹	46.80 ³⁴⁸	36.184 ²⁵⁰	26.65 ⁹⁹	30.39 ⁷⁸	3.94 ¹⁸⁷	38.501 ²²⁸	37.50 ²⁶⁰
25.6	4.720 ¹⁸⁹	50.28 ³⁶²	36.434 ²¹²	25.66 ⁸¹	31.17 ⁶¹	5.81 ²²⁴	38.729 ¹⁸⁷	40.10 ²⁵⁹
35.6	4.909	53.90	36.646	24.85	31.78	8.05	38.916	42.69
Mean Place	0.396	40.33	30.686	46.03	16.694	32.44	33.830	25.32
Sec δ, Tan δ	1.469	-1.076	1.050	+0.323	4.136	+4.013	1.038	-0.278
D _γ α, D _α α	+0.04	-0.04	+0.07	+0.01	+0.15	+0.14	+0.05	-0.01
D _γ δ, D _α δ	-0.2	+0.9	-0.2	+0.8	-0.2	+0.8	-0.2	+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Cancri. Mag. 3.8		γ Lyncis. Mag. 4.4		δ^1 Cancri. Mag. 5.9		ϵ Argus. Mag. 1.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 12 s	° ' " + 9 26 "	h m 8 17 s	° ' " +43 26 "	h m 8 18 s	° ' " +18 35 "	h m 8 20 s	° ' " -59 14 "
Jan. 0.6	6.578 ¹⁸¹	14.13 ¹²²	16.913 ²⁴³	57.11 ⁸⁰	42.759 ¹⁹⁷	38.49 ⁶⁹	52.796 ¹⁸⁴	40.43 ³⁸⁴
10.5	6.759 ¹³³	12.91 ¹⁰⁵	17.156 ¹⁷⁹	57.91 ¹⁰³	42.956 ¹⁴⁸	37.80 ⁵⁰	52.980 ⁹⁸	44.27 ³⁸⁷
20.5	6.892 ⁸¹	11.86 ⁸⁵	17.335 ¹¹¹	58.94 ¹²³	43.104 ⁹³	37.30 ²⁹	53.078 ¹¹	48.14 ³⁸²
30.5	6.973 ³⁰	11.01 ⁶⁵	17.446 ⁴¹	60.17 ¹³⁶	43.197 ⁴⁰	37.01 ¹¹	53.089 ⁷³	51.96 ³⁸⁵
Feb. 9.5	7.003 ²⁰	10.36 ⁴⁶	17.487 ²⁴	61.53 ¹⁴³	43.237 ¹²	36.90 ⁶	53.016 ¹⁵³	55.61 ³⁸⁸
19.4	6.983 ⁶⁴	9.90 ²⁸	17.463 ⁸⁶	62.96 ¹⁴¹	43.225 ⁵⁹	36.96 ²⁰	52.863 ²²²	58.99 ³⁹⁶
Mar. 1.4	6.919 ¹⁰¹	9.62 ¹⁴	17.377 ¹³⁹	64.37 ¹³²	43.166 ⁹⁸	37.16 ²⁹	52.641 ²⁸⁴	62.05 ³⁹⁸
11.4	6.818 ¹³¹	9.48 ¹	17.238 ¹⁸¹	65.69 ¹¹⁷	43.068 ¹³¹	37.45 ³⁴	52.357 ³³⁰	64.73 ³⁹⁴
21.4	6.687 ¹⁵⁰	9.47 ¹⁰	17.057 ²¹⁰	66.86 ⁹⁷	42.937 ¹⁵²	37.79 ³⁷	52.027 ³⁶⁷	66.97 ³⁹⁷
31.3	6.537 ¹⁵⁹	9.57 ¹⁷	16.847 ²²³	67.83 ⁷¹	42.785 ¹⁶⁵	38.16 ³⁷	51.660 ³⁸⁷	68.73 ³⁹⁸
Apr. 10.3	6.378 ¹⁶⁰	9.74 ²⁸	16.624 ²²⁹	68.54 ⁴⁴	42.620 ¹⁶⁵	38.53 ³⁴	51.273 ³⁹⁶	69.99 ³⁹⁹
20.3	6.218 ¹⁵¹	10.00 ³⁰	16.395 ²²⁰	68.98 ¹⁵	42.455 ¹⁵⁸	38.87 ³⁰	50.877 ³⁹³	70.73 ³⁹⁹
30.2	6.067 ¹³⁶	10.30 ³⁴	16.175 ²⁰⁰	69.13 ¹⁴	42.297 ¹⁴³	39.17 ²⁴	50.484 ³⁷⁸	70.94 ³⁹⁹
May 10.2	5.931 ¹¹³	10.64 ³⁸	15.975 ¹⁷²	68.99 ⁴¹	42.154 ¹²⁰	39.41 ²⁰	50.106 ³⁵³	70.64 ³⁹⁹
20.2	5.818 ⁸⁸	11.02 ⁴¹	15.803 ¹³⁸	68.58 ⁶⁸	42.034 ⁹⁴	39.61 ¹⁴	49.753 ³¹⁸	69.83 ³⁹⁹
30.2	5.730 ⁵⁷	11.43 ⁴⁴	15.665 ⁹⁸	67.90 ⁹¹	41.940 ⁶³	39.75 ⁹	49.435 ²⁷⁵	68.53 ³⁹⁹
June 9.1	5.673 ²⁵	11.87 ⁴⁵	15.567 ⁵⁴	66.99 ¹¹³	41.877 ³¹	39.84 ⁴	49.160 ²²⁷	66.78 ³⁹⁹
19.1	5.648 ⁵	12.32 ⁴⁵	15.513 ⁹	65.86 ¹²⁹	41.846 ¹	39.88 ²	48.933 ¹⁷²	64.63 ³⁹⁹
29.1	5.653 ³⁹	12.77 ⁴⁴	15.504 ³⁵	64.57 ¹⁴⁴	41.847 ³⁶	39.86 ⁷	48.761 ¹¹²	62.13 ³⁹⁹
July 9.1	5.692 ⁷⁰	13.21 ⁴¹	15.539 ⁷⁹	63.13 ¹⁵⁵	41.883 ⁶⁹	39.79 ¹⁴	48.649 ⁴⁷	59.38 ³⁹⁹
19.0	5.762 ⁹⁹	13.62 ³⁵	15.618 ¹²²	61.58 ¹⁶⁵	41.952 ⁹⁹	39.65 ²¹	48.602 ¹⁸	56.43 ³⁹⁹
29.0	5.861 ¹²⁹	13.97 ²⁶	15.740 ¹⁶²	59.93 ¹⁷⁰	42.051 ¹³⁰	39.44 ²⁹	48.620 ⁸⁶	53.37 ³⁹⁹
Aug. 8.0	5.990 ¹⁵⁷	14.23 ¹⁵	15.902 ²⁰¹	58.23 ¹⁷²	42.181 ¹⁵⁹	39.15 ³⁸	48.706 ¹⁵²	50.35 ³⁹⁹
17.9	6.147 ¹⁸²	14.38 ²	16.103 ²³⁷	56.51 ¹⁷⁴	42.340 ¹⁸⁵	38.77 ⁴⁹	48.858 ²¹⁸	47.40 ³⁹⁹
27.9	6.329 ²⁰⁸	14.40 ¹⁶	16.340 ²⁷³	54.77 ¹⁷³	42.525 ²¹³	38.28 ⁶²	49.076 ²⁸³	44.65 ³⁹⁹
Sept. 6.9	6.537 ²³¹	14.24 ³⁴	16.613 ³⁰³	53.04 ¹⁷⁰	42.738 ²³⁶	37.66 ⁷⁶	49.359 ³⁴¹	42.23 ³⁹⁹
16.9	6.768 ²⁵³	13.90 ⁵⁵	16.916 ³³¹	51.34 ¹⁶³	42.974 ²⁶⁰	36.90 ⁸⁸	49.700 ³⁹²	40.21 ³⁹⁹
26.8	7.021 ²⁷²	13.35 ⁷⁷	17.247 ³⁵⁹	49.71 ¹⁵⁵	43.234 ²⁸⁰	36.02 ¹⁰²	50.092 ⁴³⁶	38.69 ³⁹⁹
Oct. 6.8	7.293 ²⁹⁰	12.58 ⁹⁷	17.606 ³⁸⁰	48.16 ¹⁴³	43.514 ³⁰⁰	35.00 ¹¹⁵	50.528 ⁴⁶⁹	37.74 ³⁹⁹
16.8	7.583 ³⁰⁴	11.61 ¹¹⁷	17.986 ³⁹⁸	46.73 ¹²⁷	43.814 ³¹³	33.85 ¹²⁴	50.997 ⁴⁹²	37.41 ³⁹⁹
26.8	7.887 ³¹²	10.44 ¹³³	18.384 ⁴⁰⁹	45.46 ¹⁰⁸	44.127 ³²⁴	32.61 ¹³¹	51.489 ⁴⁹⁸	37.73 ³⁹⁹
Nov. 5.7	8.199 ³¹⁴	9.11 ¹⁴⁶	18.793 ⁴¹²	44.38 ⁸⁵	44.451 ³²⁸	31.30 ¹³⁴	51.987 ⁴⁸⁹	38.72 ³⁹⁹
15.7	8.513 ³⁰⁸	7.65 ¹⁵⁴	19.205 ⁴⁰⁷	43.53 ⁵⁸	44.779 ³²⁴	29.96 ¹³³	52.476 ⁴⁶⁸	40.35 ³⁹⁹
25.7	8.821 ²⁹⁷	6.11 ¹⁵³	19.612 ³⁶¹	42.95 ⁰	45.103 ²⁹¹	28.63 ¹¹⁴	52.944 ³⁷⁴	42.57 ³⁹⁹
Dec. 5.6	9.118 ²⁷⁵	4.55 ¹³²	20.001 ²⁷⁴	42.66 ⁶³	45.414 ²²¹	27.37 ⁸²	53.372 ²³³	45.31 ³⁹⁹
15.6	9.393 ²⁴³	3.02 ¹⁴⁴	20.362 ³²⁴	42.66 ³³	45.705 ²⁶⁰	26.23 ¹⁰⁰	53.746 ³¹⁰	48.50 ³⁹⁹
25.6	9.636 ²⁰⁵	1.58 ¹³²	20.686 ²⁷⁴	42.99 ⁶³	45.965 ²²¹	25.23 ⁸²	54.056 ²³³	52.02 ³⁹⁹
35.6	9.841 ²⁰⁵	0.26 ¹³²	20.960 ²⁷⁴	43.62 ⁶³	46.186 ²²¹	24.41 ⁸²	54.289 ²³³	55.75 ³⁹⁹
Mean Place	4.171	20.96	13.776	68.30	40.255	46.87	49.948	43.11
Sec δ , Tan δ	1.014	+0.166	1.378	+0.947	1.055	+0.336	1.956	-1.680
$D_{\alpha} \alpha$, $D_{\delta} \delta$	+0.06	+0.01	+0.08	+0.04	+0.07	+0.01	+0.02	-0.06
$D_{\alpha} \delta$, $D_{\delta} \alpha$	-0.2	+0.8	-0.2	+0.8	-0.2	+0.8	-0.2	+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	30 Monocerotis. Mag. 4.0		θ Chamæleontis. Mag. 4.3		ο Ursæ Majoris. Mag. 3.5		Groombridge 1450. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 21 s	° ' -3 38 "	h m 8 23 s	° ' -77 13 "	h m 8 23 s	° ' +60 59 "	h m 8 27 s	° ' +38 17 "
Jan. 0.6	36.149 ¹⁸⁰	22.20 ²⁰⁰	12.32 ²⁸	9.67 ³⁷⁹	32.20 ³³	23.88 ¹⁶⁸	38.351 ²³⁸	43.55 ⁴²
10.5	36.329 ¹³³	24.20 ¹⁸⁶	12.60 ⁸	13.46 ³⁸⁹	32.53 ²⁴	25.56 ¹⁹⁴	38.589 ¹⁸²	43.97 ⁶⁹
20.5	36.462 ⁸²	26.05 ¹⁶⁵	12.68 ¹²	17.35 ³⁸⁷	32.77 ¹⁵	27.50 ²¹⁵	38.771 ¹¹⁹	44.66 ⁹⁰
30.5	36.544 ³¹	27.70 ¹⁴⁵	12.56 ²⁸	21.22 ³⁷⁶	32.92 ⁵	29.65 ²²⁴	38.890 ⁵⁵	45.56 ¹⁰⁷
Feb. 9.5	36.575 ¹⁷	29.15 ¹²¹	12.28 ⁴⁵	24.98 ³⁵⁴	32.97 ⁶	31.89 ²²³	38.945 ⁹	46.63 ¹¹⁸
19.4	36.558 ⁶⁰	30.36 ⁹⁸	11.83 ⁶²	28.52 ³²⁷	32.91 ¹⁴	34.12 ²¹³	38.936 ⁶⁷	47.81 ¹²¹
Mar. 1.4	36.498 ⁹⁷	31.34 ⁷⁴	11.21 ⁷⁴	31.79 ²⁹¹	32.77 ²²	36.25 ¹⁹⁵	38.869 ¹¹⁶	49.02 ¹¹⁷
11.4	36.401 ¹²⁸	32.08 ⁵²	10.47 ⁸⁴	34.70 ²⁴⁹	32.55 ²⁸	38.20 ¹⁶⁶	38.753 ¹⁵⁶	50.19 ¹⁰⁸
21.4	36.273 ¹⁴⁶	32.60 ²⁹	9.63 ⁹²	37.19 ²⁰⁴	32.27 ³³	39.86 ¹³²	38.597 ¹⁸⁴	51.27 ⁹³
31.3	36.127 ¹⁵⁷	32.89 ⁹	8.71 ⁹⁸	39.23 ¹⁵⁴	31.94 ³⁶	41.18 ⁹⁸	38.413 ²⁰²	52.20 ⁷³
Apr. 10.3	35.970 ¹⁵⁹	32.98 ¹⁰	7.73 ¹⁰⁰	40.77 ¹⁰³	31.58 ³⁷	42.11 ⁴⁹	38.211 ²⁰⁶	52.93 ⁵²
20.3	35.811 ¹⁵²	32.88 ³⁰	6.73 ¹⁰²	41.80 ⁵⁰	31.21 ³⁶	42.60 ⁵	38.005 ²⁰⁰	53.45 ²⁷
30.2	35.659 ¹³⁹	32.58 ⁴⁵	5.71 ⁹⁹	42.30 ⁵	30.85 ³⁴	42.65 ³⁸	37.805 ¹⁸⁵	53.72 ³
May 10.2	35.520 ¹¹⁹	32.13 ⁶⁰	4.72 ⁹⁵	42.25 ⁵⁶	30.51 ³⁰	42.27 ⁸¹	37.620 ¹⁵⁹	53.75 ²²
20.2	35.401 ⁹⁵	31.53 ⁷⁶	3.77 ⁸⁸	41.69 ¹⁰⁸	30.21 ²⁵	41.46 ¹¹⁹	37.461 ¹²⁸	53.53 ⁴⁴
30.2	35.306 ⁶⁸	30.77 ⁸⁸	2.89 ⁷⁹	40.61 ¹⁵⁵	29.96 ²⁰	40.27 ¹⁵⁴	37.333 ⁹⁴	53.09 ⁶⁶
June 9.1	35.238 ³⁹	29.89 ⁹⁸	2.10 ⁶⁹	39.06 ²⁰⁰	29.76 ¹²	38.73 ¹⁸³	37.239 ⁵⁶	52.43 ⁸⁵
19.1	35.199 ⁸	28.91 ¹⁰⁵	1.41 ⁵⁶	37.06 ²³⁸	29.64 ⁷	36.90 ²¹⁰	37.183 ¹⁵	51.58 ¹⁰¹
29.1	35.191 ²³	27.86 ¹¹⁰	0.85 ⁴³	34.68 ²⁷⁰	29.57 ⁰	34.80 ²²⁸	37.168 ²⁵	50.57 ¹¹⁶
July 9.1	35.214 ⁵²	26.76 ¹¹⁰	0.42 ²⁷	31.98 ²⁹²	29.57 ⁷	32.52 ²⁴³	37.193 ⁶⁵	49.41 ¹²³
19.0	35.266 ⁸³	25.66 ¹⁰⁷	0.15 ¹⁰	29.06 ³⁰⁹	29.64 ¹³	30.09 ²⁵³	37.258 ¹⁰³	48.13 ¹³⁸
29.0	35.349 ¹¹²	24.59 ⁹⁹	0.05 ⁵	25.97 ³¹²	29.77 ²⁰	27.56 ²⁵⁸	37.361 ¹⁴⁰	46.75 ¹⁴⁵
Aug. 8.0	35.461 ¹³⁹	23.60 ⁸⁶	0.10 ²³	22.85 ³⁰⁵	29.97 ²⁶	24.98 ²⁵⁶	37.501 ¹⁷⁶	45.30 ¹⁵²
17.9	35.600 ¹⁶⁷	22.74 ⁶⁷	0.33 ⁴⁰	19.80 ²⁹¹	30.23 ³³	22.42 ²⁵²	37.677 ²¹¹	43.78 ¹⁵⁶
27.9	35.767 ¹⁹³	22.07 ⁴⁶	0.73 ⁵⁴	16.89 ²⁶²	30.56 ³⁷	19.90 ²⁴²	37.888 ²⁴¹	42.22 ¹⁵⁹
Sept. 6.9	35.960 ²¹⁸	21.61 ¹⁹	1.27 ⁶⁸	14.27 ²²⁴	30.93 ⁴³	17.48 ²²⁸	38.129 ²⁷³	40.63 ¹⁶⁰
16.9	36.178 ²⁴¹	21.42 ¹²	1.95 ⁸⁴	12.03 ¹⁷⁸	31.36 ⁴⁶	15.20 ²⁰⁹	38.402 ³⁰²	39.03 ¹⁵⁹
26.8	36.419 ²⁶²	21.54 ⁴²	2.79 ⁹²	10.25 ¹²³	31.82 ⁵¹	13.11 ¹⁸⁷	38.704 ³²⁶	37.44 ¹⁵⁵
Oct. 6.8	36.681 ²⁸¹	21.96 ⁷⁶	3.71 ⁹⁹	9.02 ⁶²	32.33 ⁵⁴	11.24 ¹⁶⁰	39.030 ³⁵⁰	35.89 ¹⁴⁹
16.8	36.962 ²⁹⁶	22.72 ¹⁰⁹	4.70 ¹⁰⁴	8.40 ⁵	32.87 ⁵⁶	9.64 ¹²⁹	39.380 ³⁶⁸	34.40 ¹³⁹
26.8	37.258 ³⁰⁶	23.81 ¹³⁸	5.74 ¹⁰⁵	8.45 ⁷⁰	33.43 ⁵⁸	8.35 ⁹⁴	39.748 ³⁸¹	33.01 ¹²⁴
Nov. 5.7	37.564 ³⁰⁸	25.19 ¹⁶⁵	6.79 ¹⁰¹	9.15 ¹³⁶	34.01 ⁵⁸	7.41 ⁵⁶	40.129 ³⁸⁷	31.77 ¹⁰⁷
15.7	37.872 ³⁰⁴	26.84 ¹⁸⁵	7.80 ⁹⁵	10.51 ¹⁹⁸	34.59 ⁵⁸	6.85 ¹⁴	40.516 ³⁸⁴	30.70 ⁸⁵
25.7	38.176 ²⁹³	28.69 ²⁰⁰	8.75 ⁸⁵	12.49 ²⁵⁴	35.17 ⁵¹	6.71 ²⁸	40.900 ³⁷¹	29.85 ⁶⁰
Dec. 5.6	38.469 ²⁷⁰	30.69 ²⁰⁹	9.60 ⁷⁰	15.03 ³⁰¹	35.71 ⁵¹	6.99 ⁷¹	41.271 ³⁴⁷	29.25 ³¹
15.6	38.739 ²⁴²	32.78 ²¹⁰	10.30 ⁵⁷	18.04 ³⁴⁰	36.22 ⁴⁵	7.70 ¹¹²	41.618 ³¹³	28.94 ³
25.6	38.981 ²⁰³	34.88 ²⁰⁴	10.87 ³⁸	21.44 ³⁶⁶	36.67 ³⁹	8.82 ¹⁴⁸	41.931 ²⁶⁹	28.91 ²⁷
35.6	39.184	36.92	11.25	25.10	37.06	10.30	42.200	29.18
Mean Place	33.867	17.05	7.370	13.92	27.941	36.92	35.444	54.98
Sec δ, Tan δ	1.002	-0.064	4.521	-4.410	2.062	+1.803	1.274	+0.790
D _φ α, D _α α	+0.06	0.00	-0.03	-0.17	+0.10	+0.07	+0.08	+0.03
D _φ δ, D _α δ	-0.2	+0.8	-0.2	+0.8	-0.2	+0.8	-0.2	+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cancri. Mag. 4.7			δ Cancri. Mag. 4.2			α Pyridis. Mag. 3.7			ι Cancri. Mag. 4.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	8	38	+21 45	8	40	+18 26	8	40	-32 53	8	41	+29 3
	s		"	s		"	s		"	s		"
Jan. 0.6	35.116		41.48	4.101		73.95	20.045		24.82	46.979		27.39
10.6	35.335	219	40.88	4.317	216	73.15	20.237	192	28.11	47.212	233	27.21
20.5	35.505	170	40.51	4.485	168	72.56	20.375	138	31.38	47.395	183	27.28
30.5	35.622	117	40.38	4.601	116	72.20	20.457	82	34.54	47.521	126	27.60
Feb. 9.5	35.684	62	40.44	4.662	61	72.07	20.482	25	37.51	47.589	68	28.11
		8			9			29			11	
19.4	35.692		40.69	4.671		72.11	20.453		40.24	47.600		28.79
Mar. 1.4	35.650	42	41.08	4.631	40	72.31	20.374	79	42.67	47.558	42	29.56
11.4	35.565	85	41.55	4.549	82	72.62	20.253	121	44.75	47.469	89	30.39
21.4	35.445	120	42.07	4.432	117	73.01	20.097	156	46.45	47.342	127	31.22
31.3	35.300	145	42.60	4.292	140	73.44	19.917	180	47.76	47.189	153	31.99
		160			156			196			172	
Apr. 10.3	35.140		43.11	4.136		73.87	19.721		48.68	47.017		32.67
20.3	34.973	167	43.57	3.976	160	74.28	19.519	202	49.17	46.840	177	33.21
30.3	34.813	160	43.95	3.819	157	74.65	19.318	201	49.25	46.667	173	33.62
May 10.2	34.664	149	44.24	3.674	145	74.97	19.127	191	48.93	46.506	161	33.85
20.2	34.533	131	44.43	3.548	126	75.22	18.953	174	48.21	46.363	143	33.93
		105			103			151			116	
30.2	34.428		44.54	3.445		75.41	18.802		47.13	46.247		33.85
June 9.1	34.351	77	44.55	3.369	76	75.54	18.676	126	45.71	46.160	87	33.60
19.1	34.303	48	44.47	3.322	47	75.60	18.578	98	43.98	46.105	55	33.21
29.1	34.288	15	44.30	3.307	15	75.59	18.514	64	42.01	46.084	21	32.69
July 9.1	34.306	18	44.04	3.323	16	75.51	18.483	31	39.83	46.098	14	32.05
		48			47			4			47	
19.0	34.354		43.70	3.370		75.35	18.487		37.53	46.145		31.28
29.0	34.436	82	43.27	3.449	79	75.10	18.528	41	35.17	46.227	82	30.42
Aug. 8.0	34.548	112	42.74	3.557	108	74.76	18.606	78	32.83	46.341	114	29.46
18.0	34.689	141	42.11	3.693	136	74.31	18.720	114	30.59	46.487	146	28.40
27.9	34.860	171	41.36	3.859	166	73.74	18.871	151	28.55	46.664	177	27.24
		198			192			186			206	
Sept. 6.9	35.058		40.50	4.051		73.03	19.057		26.79	46.870		26.00
16.9	35.283	225	39.52	4.271	220	72.18	19.278	221	25.37	47.104	234	24.68
26.8	35.534	251	38.42	4.515	244	71.19	19.532	254	24.39	47.367	263	23.29
Oct. 6.8	35.808	274	37.20	4.784	269	70.05	19.814	282	23.89	47.655	288	21.85
16.8	36.105	297	35.89	5.074	290	68.79	20.123	309	23.93	47.967	312	20.38
		314			309			327			330	
26.8	36.419		34.51	5.383		67.42	20.450		24.51	48.297		18.91
Nov. 5.7	36.747	328	33.09	5.705	322	65.98	20.790	340	25.63	48.644	347	17.48
15.7	37.083	336	31.67	6.035	330	64.51	21.135	345	27.27	48.999	355	16.13
25.7	37.418	335	30.30	6.365	330	63.05	21.475	340	29.39	49.352	353	14.92
Dec. 5.7	37.745	327	29.02	6.687	322	61.65	21.799	324	31.92	49.698	346	13.87
		306			303			299			328	
15.6	38.053		27.90	6.990		60.37	22.098		34.78	50.026		13.03
25.6	38.334	281	26.96	7.266	276	59.26	22.362	264	37.88	50.324	298	12.44
35.6	38.576	242	26.23	7.506	240	58.33	22.582	220	41.11	50.582	258	12.10
Mean Place	32.631		51.34	1.670		83.34	17.795		24.57	44.373		38.55
Sec δ, Tan δ	1.077		+0.399	1.054		+0.334	1.191		-0.647	1.144		+0.555
D _γ α, D _α α	+0.07		+0.02	+0.07		+0.01	+0.05		-0.03	+0.07		+0.02
D _γ δ, D _α δ	-0.3		+0.8	-0.3		+0.8	-0.3		+0.8	-0.3		+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ι Ursae Majoris. Mag. 3.1		α Cancri. Mag. 4.3		β ¹ Carinae. Mag. 5.1		κ Ursae Majoris. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 53 s	° ' +48 21 "	h m 8 54 s	° ' +12 10 "	h m 8 54 s	° ' -58 54 "	h m 8 58 s	° ' +47 28 "
n. 0.6	39.227	37.67	2.581	24.22	60.682	41.44	5.185	39.42
10.6	39.528 301	38.49 82	2.802 221	23.01 121	60.932 250	45.20 376	5.488 303	40.17 75
20.5	39.764 236	39.64 115	2.977 175	22.00 101	61.098 166	49.06 386	5.727 239	41.24 107
30.5	39.930 166	41.04 140	3.102 125	21.23 77	61.181 83	52.94 388	5.898 171	42.59 135
ab. 9.5	40.020 90	42.65 161	3.175 73	20.67 56	61.179 2	56.71 377	5.996 98	44.15 156
	18	173	21	34	83	359	25	170
19.5	40.038	44.38	3.196	20.33	61.096	60.30	6.021	45.85
ar. 1.4	39.985 53	46.14 176	3.170 26	20.19 14	60.939 157	63.63 333	5.976 45	47.58 173
11.4	39.870 115	47.85 171	3.102 68	20.20 1	60.718 221	66.62 299	5.871 105	49.28 170
21.4	39.703 167	49.41 156	3.000 102	20.34 14	60.442 276	69.22 260	5.713 158	50.85 157
31.4	39.496 207	50.78 137	2.871 129	20.60 26	60.125 317	71.38 216	5.515 198	52.24 139
	233	110	143	31	348	168	224	114
pr. 10.3	39.263	51.88	2.728	20.91	59.777	73.06	5.291	53.38
20.3	39.017 246	52.68 80	2.577 151	21.27 36	59.409 368	74.24 118	5.052 239	54.22 84
30.3	38.770 247	53.15 47	2.427 150	21.66 39	59.038 371	74.91 67	4.812 240	54.74 52
ay 10.2	38.534 236	53.27 12	2.286 141	22.05 39	58.670 368	75.05 14	4.582 230	54.92 18
20.2	38.320 214	53.05 23	2.162 124	22.44 39	58.319 351	74.69 36	4.373 209	54.76 16
	185	55	105	38	328	87	182	48
30.2	38.135	52.50	2.057	22.82	57.991	73.82	4.191	54.28
ine 9.2	37.987 148	51.64 86	1.977 80	23.18 36	57.696 295	72.45 137	4.044 147	53.48 80
19.1	37.879 108	50.48 116	1.923 54	23.50 32	57.441 255	70.67 178	3.936 108	52.39 109
29.1	37.815 64	49.08 140	1.898 25	23.79 29	57.232 209	68.49 218	3.870 66	51.06 133
ly 9.1	37.796 19	47.46 162	1.900 2	24.03 24	57.076 156	65.99 250	3.848 22	49.50 156
	27	180	83	19	97	276	23	174
19.1	37.823	45.66	1.933	24.22	56.979	63.23	3.871	47.76
29.0	37.895 72	43.71 195	1.995 62	24.32 10	56.944 35	60.30 293	3.937 66	45.86 190
ug. 8.0	38.012 117	41.65 206	2.084 89	24.33 1	56.971 27	57.30 300	4.048 111	43.83 203
18.0	38.173 161	39.50 215	2.203 119	24.22 11	57.066 95	54.34 296	4.201 153	41.72 211
27.9	38.375 202	37.31 219	2.349 146	23.96 26	57.227 161	51.50 284	4.395 194	39.56 216
	243	219	174	42	228	259	234	219
pt. 6.9	38.618	35.12	2.523	23.54	57.455	48.91	4.629	37.37
16.9	38.899 281	32.94 218	2.724 201	22.95 59	57.746 291	46.65 226	4.903 274	35.20 217
26.9	39.219 320	30.83 211	2.951 227	22.15 80	58.098 352	44.83 182	5.213 310	33.08 212
ct. 6.8	39.573 354	28.81 202	3.204 253	21.17 98	58.501 403	43.55 128	5.558 345	31.04 204
16.8	39.957 384	26.93 188	3.480 276	19.99 118	58.948 447	42.84 71	5.934 376	29.13 191
	411	169	298	135	479	7	405	174
26.8	40.368	25.24	3.778	18.64	59.427	42.77	6.339	27.39
ov. 5.8	40.798 430	23.77 147	4.088 310	17.14 150	59.925 498	43.35 58	6.763 424	25.88 151
15.7	41.243 445	22.59 118	4.410 322	15.55 159	60.428 503	44.60 125	7.200 437	24.63 126
25.7	41.687 444	21.71 88	4.734 324	13.89 166	60.919 491	46.46 186	7.640 440	23.69 94
ec. 5.7	42.123 436	21.19 52	5.051 317	12.26 163	61.384 465	48.88 242	8.073 433	23.09 60
	414	15	302	159	422	293	412	22
15.6	42.537	21.04	5.353	10.67	61.806	51.81	8.485	22.87
25.6	42.916 379	21.28 24	5.631 278	9.19 148	62.169 363	55.12 331	8.864 379	23.03 16
35.6	43.248 332	21.89 61	5.874 243	7.87 132	62.465 296	58.72 360	9.197 333	23.57 54
n Place	36.080	52.22	0.277	33.09	57.967	45.54	2.107	54.20
δ, Tan δ	1.505	+1.125	1.023	+0.216	1.937	-1.659	1.480	+1.090
Δ _a	+0.08	+0.05	+0.07	+0.01	+0.03	-0.08	+0.08	+0.05
Δ _δ	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	σ^3 Ursæ Majoris. Mag. 4.9		κ Cancrī. Mag. 5.1		λ Argus. Mag. 2.2		θ Hydræ. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 3	° ' " +67 27	h m 9 3	° ' " +10 59	h m 9 4	° ' " -43 6	h m 9 10	° ' " + 2 39
	s	"	s	"	s	"	s	"
Jan. 0.6	16.66	50.08	20.733	47.13	61.037	2.21	8.149	32.07
10.6	17.13 47	51.73 165	20.961 228	45.81 132	61.266 220	5.72 351	8.375 226	30.29 178
20.6	17.50 37	53.76 203	21.144 183	44.71 110	61.437 171	9.30 358	8.558 183	28.68 161
30.5	17.76 26	56.06 230	21.277 133	43.83 88	61.546 109	12.84 354	8.693 135	27.27 141
Feb. 9.5	17.90 14	58.56 250	21.359 82	43.18 65	61.591 45	16.26 342	8.777 84	26.09 118
	1	257	31	42	15	322	34	96
19.5	17.91	61.13	21.390	42.76	61.576	19.48	8.811	25.13
Mar. 1.4	17.80 11	63.66 253	21.372 18	42.55 21	61.504 72	22.42 204	8.798 13	24.42 71
11.4	17.59 21	66.04 238	21.312 60	42.50 5	61.382 122	25.04 262	8.743 55	23.92 50
21.4	17.29 30	68.20 216	21.218 94	42.60 10	61.219 163	27.28 224	8.655 88	23.62 30
31.4	16.91 38	70.01 181	21.096 122	42.83 23	61.024 195	29.11 183	8.539 116	23.50 12
	44	142	139	30	218	142	132	3
Apr. 10.3	16.47	71.43	20.957	43.13	60.806	30.53	8.407	23.53
20.3	16.01 46	72.39 96	20.810 147	43.49 36	60.576 230	31.48 95	8.265 142	23.70 17
30.3	15.53 48	72.88 49	20.663 147	43.89 40	60.341 235	31.98 50	8.122 143	24.00 30
May 10.3	15.07 46	72.86 2	20.523 140	44.30 41	60.111 230	32.01 3	7.985 137	24.39 39
20.2	14.65 42	72.36 50	20.396 127	44.72 42	59.892 219	31.58 43	7.861 124	24.87 48
	40	96	107	42	200	86	108	55
30.2	14.25	71.40	20.289	45.14	59.692	30.72	7.753	25.42
June 9.2	13.92 33	70.01 139	20.204 85	45.54 40	59.516 176	29.45 127	7.666 87	26.02 60
19.1	13.65 27	68.22 179	20.145 59	45.92 38	59.367 149	27.80 165	7.602 64	26.67 65
29.1	13.45 20	66.08 214	20.113 32	46.26 34	59.251 116	25.82 198	7.563 39	27.35 68
July 9.1	13.34 11	63.67 241	20.107 6	46.56 30	59.170 81	23.57 225	7.551 12	28.03 68
	4	266	24	23	42	245	16	66
19.1	13.30	61.01	20.131	46.79	59.128	21.12	7.567	28.69
29.0	13.36 6	58.19 282	20.183 52	46.95 16	59.125 3	18.52 260	7.609 42	29.30 61
Aug. 8.0	13.49 13	55.26 293	20.264 81	47.01 6	59.165 40	15.89 263	7.679 70	29.83 58
18.0	13.70 21	52.27 299	20.373 109	46.95 6	59.249 84	13.32 257	7.775 96	30.23 40
28.0	13.99 29	49.27 300	20.509 136	46.73 22	59.377 128	10.87 245	7.901 126	30.47 24
	36	293	165	37	173	221	155	6
Sept. 6.9	14.35	46.34	20.674	46.36	59.550	8.66	8.056	30.53
16.9	14.79 44	43.51 283	20.865 191	45.80 56	59.767 217	6.78 188	8.237 181	30.36 17
26.9	15.29 50	40.86 265	21.085 220	45.02 78	60.026 259	5.32 146	8.447 210	29.95 41
Oct. 6.8	15.85 56	38.43 243	21.331 246	44.05 97	60.323 297	4.35 97	8.683 236	29.26 69
16.8	16.46 61	36.29 214	21.600 269	42.87 118	60.653 330	3.93 42	8.946 263	28.31 95
	66	183	291	136	358	16	283	122
26.8	17.12	34.46	21.891	41.51	61.011	4.09	9.229	27.09
Nov. 5.8	17.81 69	33.03 143	22.201 310	40.00 151	61.388 377	4.85 76	9.532 303	25.63 146
15.7	18.52 71	32.03 100	22.521 320	38.36 164	61.774 386	6.20 135	9.846 314	23.95 168
25.7	19.23 71	31.50 53	22.844 323	36.66 170	62.158 384	8.11 191	10.165 319	22.12 183
Dec. 5.7	19.93 70	31.45 5	23.163 319	34.94 172	62.528 370	10.52 241	10.481 316	20.19 193
	66	46	305	166	345	282	301	197
15.6	20.59	31.91	23.468	33.28	62.873	13.34	10.782	18.22
25.6	21.20 61	32.88 97	23.750 282	31.71 157	63.180 307	16.51 317	11.061 279	16.28 194
35.6	21.73 53	34.28 140	23.999 249	30.29 142	63.441 261	19.90 339	11.309 248	14.43 185
Mean Place	11.961	67.09	18.477	56.09	58.756	4.28	5.983	39.46
Sec δ , Tan δ	2.609	+2.410	1.019	+0.194	1.369	-0.936	1.001	+0.046
$D_{\psi} a$, $D_{\omega} a$	+0.11	+0.12	+0.06	+0.01	+0.04	-0.04	+0.06	0.00
$D_{\psi} \delta$, $D_{\omega} \delta$	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Argus. Mag. 1.8		δ Cancri. Mag. 6.6		ϵ Argus. Mag. 2.2		40 Lynceis. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 12 s	° ' -69 22 "	h m 9 14 s	° ' +18 2 "	h m 9 14 s	° ' -58 55 "	h m 9 16 s	° ' +34 43 "
Jan. 0.6	21.63	39.61	26.772	62.33	56.221	45.73	6.428	70.17
10.6	21.98 35	43.28 367	27.017 245	61.35 98	56.509 288	49.40 367	6.705 277	70.11 6
20.6	22.22 24	47.15 387	27.217 200	60.63 72	56.716 207	53.23 383	6.932 227	70.37 26
30.5	22.35 13	51.10 395	27.366 149	60.15 48	56.840 124	57.10 387	7.103 171	70.91 54
Feb. 9.5	22.35 0	55.03 393	27.463 97	59.93 22	56.880 40	60.93 383	7.212 109	71.72 81
	11	381	42	1	42	368	48	100
19.5	22.24	58.84	27.505	59.92	56.838	64.61	7.260	72.72
Mar. 1.4	22.02 22	62.44 360	27.499 6	60.12 20	56.722 116	68.05 344	7.250 10	73.87 115
11.4	21.71 31	65.76 332	27.447 52	60.46 34	56.536 186	71.20 315	7.188 62	75.08 121
21.4	21.32 39	68.72 296	27.358 89	60.90 44	56.294 242	73.99 279	7.081 107	76.28 120
31.4	20.86 46	71.27 255	27.239 119	61.42 52	56.005 289	76.35 236	6.940 141	77.41 113
	51	210	138	54	324	191	166	103
Apr. 10.3	20.35	73.37	27.101	61.96	55.681	78.26	6.774	78.44
20.3	19.81 54	74.98 161	26.952 149	62.49 53	55.334 347	79.69 143	6.594 180	79.29 85
30.3	19.24 57	76.07 109	26.801 151	63.00 51	54.975 359	80.61 92	6.410 184	79.94 65
May 10.3	18.67 57	76.63 56	26.656 145	63.45 45	54.616 359	81.01 40	6.232 178	80.38 44
20.2	18.11 56	76.63 0	26.523 133	63.83 38	54.267 349	80.90 11	6.069 163	80.58 20
	53	52	115	30	331	62	145	2
30.2	17.58	76.11	26.408	64.13	53.936	80.28	5.924	80.56
June 9.2	17.08 50	75.08 103	26.315 93	64.34 21	53.631 305	79.17 111	5.806 118	80.29 27
19.1	16.63 45	73.56 152	26.247 68	64.47 13	53.361 270	77.60 157	5.716 90	79.82 47
29.1	16.24 39	71.60 196	26.205 42	64.51 4	53.134 227	75.62 198	5.658 58	79.12 70
July 9.1	15.92 32	69.26 234	26.193 12	64.46 5	52.954 180	73.30 232	5.634 24	78.25 87
	22	267	13	15	127	263	9	105
19.1	15.70 16	66.59 289	26.206 43	64.31 27	52.827 68	70.67 282	5.643 42	77.20 121
29.0	15.54 4	63.70 305	26.249 73	64.04 38	52.759 5	67.85 294	5.685 78	75.99 135
Aug. 8.0	15.50 5	60.65 309	26.322 101	63.66 51	52.754 60	64.91 296	5.763 111	74.64 148
18.0	15.55 15	57.56 301	26.423 130	63.15 65	52.814 128	61.95 288	5.874 144	73.16 160
28.0	15.70 27	54.55 284	26.553 159	62.50 80	52.942 196	59.07 267	6.018 179	71.56 168
Sept. 6.9	15.97	51.71	26.712	61.70	53.138	56.40	6.197	69.88
16.9	16.33 36	49.16 255	26.900 188	60.74 96	53.400 262	54.01 239	6.409 212	68.11 177
26.9	16.78 45	47.00 216	27.118 218	59.62 112	53.726 326	52.04 197	6.654 245	66.29 182
Oct. 6.8	17.31 53	45.32 168	27.363 245	58.35 127	54.108 382	50.56 148	6.929 275	64.44 185
16.8	17.92 61	44.20 112	27.634 271	56.94 141	54.540 432	49.64 92	7.235 306	62.60 184
	66	48	296	155	470	31	331	181
26.8	18.58	43.72	27.930	55.39	55.010	49.33	7.566	60.79
Nov. 5.8	19.27 69	43.89 17	28.244 314	53.76 163	55.507 497	49.68 35	7.921 355	59.06 173
15.7	19.97 70	44.73 84	28.572 328	52.10 166	56.015 508	50.68 100	8.289 368	57.49 157
25.7	20.66 69	46.23 150	28.906 334	50.45 165	56.519 504	52.31 163	8.666 377	56.08 141
Dec. 5.7	21.31 65	48.34 211	29.238 332	48.85 160	57.002 483	54.53 222	9.040 374	54.93 115
	60	266	320	148	447	274	360	90
15.7	21.91	51.00	29.558	47.37	57.449	57.27	9.400	54.03
25.6	22.42 51	54.12 312	29.855 297	46.05 132	57.845 396	60.44 317	9.737 337	53.45 58
35.6	22.84 42	57.61 349	30.121 266	44.95 110	58.178 333	63.98 354	10.038 301	53.20 25
Mean Place	18.333	45.65	24.485	73.16	53.594	50.62	3.868	84.28
Sec δ , Tan δ	2.840	-2.658	1.051	+0.326	1.938	-1.660	1.217	+0.693
$D_{\delta} a$, $D_{\omega} a$	+0.01	-0.13	+0.07	+0.02	+0.03	-0.08	+0.07	+0.03
$D_{\delta} \delta$, $D_{\omega} \delta$	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	<i>θ</i> Pyridis. Mag. 4.9		<i>α</i> Hydre. Mag. 2.2		<i>h</i> Ursæ Majoris. Mag. 3.8		<i>d</i> Ursæ Majoris. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 17 s	° ' " -25 36 "	h m 9 23 s	° ' " -8 18 "	h m 9 25 s	° ' " +63 24 "	h m 9 27 s	° ' " +70 10 "
Jan. 0.6	53.630	59.80	35.568	14.06	8.85	58.20	20.34	71.20
10.6	53.859 229	62.80 300	35.802 234	16.38 232	9.30 45	59.50 130	20.92 58	72.75 155
20.6	54.041 182	65.80 300	35.991 189	18.60 222	9.68 38	61.20 170	21.38 46	74.72 197
30.5	54.172 131	68.71 291	36.132 141	20.64 204	9.95 27	63.24 204	21.72 34	77.02 230
Feb. 9.5	54.249 77	71.46 275	36.223 91	22.50 186	10.13 18	65.52 228	21.93 21	79.58 256
	24	253	42	161	5	243	8	267
19.5	54.273	73.99	36.265	24.11	10.18	67.95	22.01	82.25
Mar. 1.5	54.247 26	76.27 228	36.260 5	25.48 137	10.15 3	70.42 247	21.93 8	84.95 270
11.4	54.179 68	78.23 196	36.214 46	26.58 110	10.02 13	72.81 239	21.75 18	87.54 259
21.4	54.073 106	79.88 165	36.132 82	27.43 85	9.80 22	75.05 224	21.45 30	89.94 240
31.4	53.940 133	81.19 131	36.022 110	28.03 60	9.52 28	77.00 195	21.06 39	92.02 208
	153	95	128	35	34	162	47	170
Apr. 10.3	53.787	82.14 60	35.894	28.38 12	9.18	78.62 122	20.59	93.72 126
20.3	53.621 166	82.74 24	35.755 139	28.50 9	8.81 37	79.84 78	20.08 51	94.98 77
30.3	53.453 168	82.98 11	35.612 143	28.41 30	8.42 39	80.62 31	19.54 54	95.75 26
May 10.3	53.288 165	82.87 44	35.473 139	28.11 80	8.03 39	80.93 15	19.00 51	96.01 24
20.2	53.132 156	82.43 76	35.343 130	27.63 67	7.66 37	80.78 62	18.49 48	95.77 76
	141		115		34			
30.2	52.991	81.67	35.228	26.96	7.32	80.16	18.01	95.01
June 9.2	52.870 121	80.60 107	35.130 98	26.15 81	7.02 30	79.10 106	17.58 43	93.79 122
19.2	52.770 100	79.27 133	35.054 76	25.21 94	6.77 25	77.64 146	17.22 36	92.13 166
29.1	52.696 74	77.70 157	35.000 54	24.16 105	6.58 19	75.82 182	16.93 29	90.08 205
July 9.1	52.648 48	75.95 175	34.971 29	23.03 113	6.45 13	73.68 214	16.72 21	87.71 237
	17	188	3	116	6	241	12	268
19.1	52.631	74.07	34.968	21.87	6.39	71.27	16.60	85.03
29.0	52.644 13	72.12 195	34.992 24	20.70 117	6.40 1	68.64 263	16.58 2	82.15 288
Aug. 8.0	52.688 44	70.16 196	35.043 51	19.59 111	6.47 7	65.86 278	16.65 7	79.10 305
18.0	52.766 78	68.26 190	35.123 80	18.57 102	6.61 14	62.96 290	16.80 15	75.95 315
28.0	52.877 111	66.52 174	35.232 109	17.71 86	6.81 20	60.01 295	17.04 24	72.76 319
	145	152	137	65	27	295	33	316
Sept. 6.9	53.022	65.00	35.369	17.06	7.08	57.06	17.37	69.60
16.9	53.201 179	63.77 87	35.538 169	16.66 10	7.42 34	54.17 289	17.80 43	66.53 307
26.9	53.414 213	62.90 45	35.736 198	16.56 24	7.81 39	51.38 279	18.30 50	63.59 294
Oct. 6.9	53.659 245	62.45 2	35.963 227	16.80 59	8.26 45	48.77 261	18.87 57	60.86 273
16.8	53.933 274	62.47 50	36.218 255	17.39 94	8.77 51	46.38 239	19.51 64	58.41 245
	301		279		54	211	70	213
26.8	54.234	62.97	36.497	18.33	9.31	44.27 176	20.21	56.28 174
Nov. 5.8	54.554 320	63.96 99	36.797 300	19.62 129	9.91 60	42.51 137	20.95 74	54.54 131
15.7	54.886 332	65.43 147	37.110 313	21.24 162	10.52 61	41.14 94	21.73 78	53.23 82
25.7	55.222 336	67.32 189	37.430 320	23.13 189	11.14 62	40.20 46	22.52 79	52.41 30
Dec. 5.7	55.553 331	69.61 229	37.747 317	25.24 211	11.76 62	39.74 4	23.31 79	52.11 23
	314	259	305	225	59		75	
15.7	55.867	72.20	38.052	27.49	12.35	39.78	24.06	52.34
25.6	56.156 289	75.01 281	38.336 284	29.83 234	12.91 56	40.32 54	24.77 71	53.11 77
35.6	56.408 252	77.96 295	38.588 252	32.16 233	13.40 49	41.34 102	25.40 63	54.37 126
Mean Place	51.535	58.68	33.499	8.96	4.950	76.73	15.533	90.37
Sec <i>δ</i> , Tan <i>δ</i>	1.109	-0.480	1.011	-0.146	2.234	+1.998	2.951	+2.776
<i>D_μα</i> , <i>D_ωα</i>	+0.05	-0.02	+0.06	-0.01	+0.09	+0.10	+0.11	+0.15
<i>D_μδ</i> , <i>D_ωδ</i>	-0.3	+0.7	-0.3	+0.6	-0.3	+0.6	-0.3	+0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	♄ Ursa Majoris. Mag. 3.3		♃ Argus. Mag. 3.6		♋ Leonis. Mag. 5.1		10 Leonis Minoris. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 27 s	° ' +52 2	h m 9 27 s	° ' -40 6	h m 9 27 s	° ' +11 39	h m 9 29 s	° ' +36 45
a. 0.6	26.010	49.33	30.201	25.11	33.846	39.14	14.864	29.43
10.6	26.366 ³⁵⁶	50.06 ⁷³	30.454 ²⁵³	28.48 ³³⁷	34.094 ²⁴⁸	37.76 ¹³⁸	15.159 ²⁹⁵	29.39 ⁴
20.6	26.659 ²⁹³	51.18 ¹¹²	30.653 ¹⁹⁹	31.94 ³⁴⁶	34.299 ²⁰⁵	36.62 ¹¹⁴	15.405 ²⁴⁶	29.70 ³¹
30.5	26.879 ²²⁰	52.64 ¹⁴⁶	30.792 ¹³⁹	35.40 ³⁴⁶	34.456 ¹⁵⁷	35.72 ⁹⁰	15.592 ¹⁸⁷	30.32 ⁶²
b. 9.5	27.021 ¹⁴²	54.37 ¹⁷³	30.872 ⁸⁰	38.76 ³³⁶	34.562 ¹⁰⁶	35.07 ⁶⁵	15.719 ¹²⁷	31.21 ⁸⁹
	65	191	22	318	55	42	66	111
19.5	27.086	56.28	30.894	41.94	34.617	34.65	15.785	32.32
r. 1.5	27.073 ¹³	58.28 ²⁰⁰	30.859 ³⁵	44.89 ²⁹⁵	34.623 ⁶	34.46 ¹⁹	15.790 ⁵	33.58 ¹²⁶
11.4	26.990 ⁸³	60.28 ²⁰⁰	30.774 ⁸⁵	47.53 ²⁶⁴	34.585 ³⁸	34.46 ⁰	15.740 ⁵⁰	34.93 ¹³⁵
21.4	26.844 ¹⁴⁶	62.18 ¹⁹⁰	30.647 ¹²⁷	49.82 ²²⁹	34.509 ⁷⁶	34.61 ¹⁵	15.643 ⁹⁷	36.27 ¹³⁴
31.4	26.648 ¹⁹⁶	63.89 ¹⁷¹	30.486 ¹⁶¹	51.74 ¹⁹²	34.405 ¹⁰⁴	34.90 ²⁹	15.507 ¹³⁶	37.56 ¹²⁹
	232	147	186	151	126	37	163	115
r. 10.3	26.416	65.36	30.300	53.25	34.279	35.27	15.344	38.71
20.3	26.160 ²⁵⁶	66.52 ¹¹⁶	30.099 ²⁰¹	54.33 ¹⁰⁸	34.141 ¹³⁸	35.69 ⁴²	15.165 ¹⁷⁹	39.69 ⁹⁶
30.3	25.894 ²⁶⁶	67.32 ⁸⁰	29.890 ²⁰⁹	54.97 ⁶⁴	33.999 ¹⁴²	36.15 ⁴⁶	14.979 ¹⁸⁶	40.46 ⁷⁷
y 10.3	25.630 ²⁶⁴	67.75 ⁴³	29.680 ²¹⁰	55.18 ²¹	33.861 ¹³⁸	36.62 ⁴⁷	14.796 ¹⁸³	40.99 ⁵³
20.2	25.380 ²⁵⁰	67.79 ⁴	29.478 ²⁰²	54.95 ²³	33.732 ¹²⁹	37.08 ⁴⁶	14.625 ¹⁷¹	41.26 ²⁷
	228	34	189	65	114	44	154	2
30.2	25.152	67.45	29.289	54.30	33.618	37.52	14.471	41.28
ne 9.2	24.955 ¹⁹⁷	66.73 ⁷²	29.119 ¹⁷⁰	53.25 ¹⁰⁵	33.523 ⁹⁵	37.93 ⁴¹	14.340 ¹³¹	41.04 ²⁴
19.2	24.795 ¹⁶⁰	65.66 ¹⁰⁷	28.971 ¹⁴⁸	51.83 ¹⁴²	33.451 ⁷²	38.30 ³⁷	14.238 ¹⁰²	40.56 ⁴⁸
29.1	24.675 ¹²⁰	64.29 ¹³⁷	28.851 ¹²⁰	50.07 ¹⁷⁶	33.401 ⁵⁰	38.62 ³²	14.165 ⁷³	39.85 ⁷¹
ly 9.1	24.601 ⁷⁴	62.62 ¹⁶⁷	28.761 ⁹⁰	48.03 ²⁰⁴	33.378 ²³	38.87 ²⁵	14.125 ⁴⁰	38.90 ⁹⁶
	30	191	56	225	2	18	6	114
19.1	24.571	60.71	28.705	45.78	33.380	39.05	14.119	37.76
29.0	24.588 ¹⁷	58.58 ²¹³	28.683	43.37 ²⁴¹	33.410 ³⁰	39.14 [—]	14.147 ²³	36.45 ¹³¹
g. 8.0	24.652 ⁶⁴	56.30 ²²⁸	28.701 ¹⁸	40.90 ²⁴⁷	33.468 ⁵⁸	39.11 ³	14.209 ⁶²	34.98 ¹⁴⁷
18.0	24.763 ¹¹¹	53.88 ²⁴²	28.759 ⁵⁸	38.43 ²⁴⁷	33.552 ⁸⁴	38.96 ¹⁵	14.305 ⁹⁶	33.35 ¹⁶³
28.0	24.921 ¹⁵⁸	51.37 ²⁵¹	28.859 ¹⁰⁰	36.07 ²³⁶	33.665 ¹¹³	38.65 ³¹	14.437 ¹³²	31.61 ¹⁷⁴
	204	256	143	215	141	47	167	184
pt. 6.9	25.125	48.81	29.002	33.92	33.806	38.18	14.604	29.77
16.9	25.375 ²⁵⁰	46.25 ²⁵⁶	29.188 ¹⁸⁶	32.06 ¹⁸⁶	33.978 ¹⁷²	37.51 ⁶⁷	14.806 ²⁰²	27.84 ¹⁹³
26.9	25.669 ²⁹⁴	43.74 ²⁵¹	29.416 ²²⁸	30.58 ¹⁴⁸	34.178 ²⁰⁰	36.65 ⁸⁶	15.042 ²³⁶	25.86 ¹⁹⁸
t. 6.9	26.006 ³³⁷	41.30 ²⁴⁴	29.685 ²⁶⁹	29.54 ¹⁰⁴	34.406 ²²⁸	35.58 ¹⁰⁷	15.312 ²⁷⁰	23.85 ²⁰¹
16.8	26.381 ³⁷⁵	39.00 ²³⁰	29.990 ³⁰⁵	29.03 ⁵¹	34.663 ²⁵⁷	34.31 ¹²⁷	15.614 ³⁰²	21.85 ²⁰⁰
	412	210	335	4	281	145	331	194
26.8	26.793	36.90	30.325	29.07	34.944	32.86	15.945	19.91
v. 5.8	27.234 ⁴⁴¹	35.04 ¹⁸⁶	30.685 ³⁶⁰	29.68 ⁶¹	35.248 ³⁰⁴	31.24 ¹⁶²	16.301 ³⁵⁶	18.06 ¹⁸⁵
15.7	27.696 ⁴⁶²	33.48 ¹⁵⁶	31.059 ³⁷⁴	30.87 ¹¹⁹	35.566 ³¹⁸	29.52 ¹⁷²	16.675 ³⁷⁴	16.37 ¹⁶⁹
25.7	28.169 ⁴⁷³	32.27 ¹²¹	31.438 ³⁷⁹	32.60 ¹⁷³	35.892 ³²⁶	27.73 ¹⁷⁹	17.060 ³⁸⁵	14.88 ¹⁴⁹
c. 5.7	28.641 ⁴⁷²	31.45 ⁸²	31.809 ³⁷¹	34.83 ²²³	36.218 ³²⁶	25.93 ¹⁸⁰	17.445 ³⁸⁵	13.65 ¹²³
	457	39	351	266	316	174	374	95
15.7	29.098	31.06	32.160	37.49	36.534	24.19	17.819	12.70
25.6	29.526 ⁴²⁸	31.10 ⁴	32.481 ³²¹	40.50 ³⁰¹	36.831 ²⁹⁷	22.56 ¹⁶³	18.170 ³⁵¹	12.11 ⁵⁹
35.6	29.911 ³⁸⁵	31.56 ⁴⁶	32.761 ²⁸⁰	43.75 ³²⁵	37.098 ²⁶⁷	21.08 ¹⁴⁸	18.488 ³¹⁸	11.85 ²⁶
Place	22.944	66.80	28.041	27.21	31.684	49.04	12.336	44.67
, Tan δ	1.626	+1.282	1.308	-0.842	1.021	+0.206	1.248	+0.747
D _∞ α	+0.08	+0.07	+0.05	-0.04	+0.06	+0.01	+0.07	+0.04
D _∞ δ	-0.3	+0.6	-0.3	+0.6	-0.3	+0.6	-0.3	+0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	O Leonis. Mag. 3.8		θ Antile. Mag. 5.0		ε Leonis. Mag. 3.1		υ Argus Mag. 3.	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	
	h m 9 36	° ' +10 15	h m 9 40	° ' -27 23	h m 9 41	° ' +24 8	h m 9 45	
	s	"	s	"	s	"	s	
Jan. 0.6	48.683	48.12	34.772	37.14	14.234	55.25	5.93	2
10.6	48.936 ²⁵³	46.65 ¹⁴⁷	35.024 ²⁵²	40.15 ³⁰¹	14.509 ²⁷⁵	54.47 ⁷⁸	6.31 ³⁸	2
20.6	49.148 ²¹²	45.40 ¹²⁵	35.230 ²⁰⁶	43.19 ³⁰⁴	14.741 ²³²	53.98 ⁴⁹	6.61 ³⁰	2
30.5	49.313 ¹⁶⁵	44.38 ¹⁰²	35.386 ¹⁵⁶	46.19 ³⁰⁰	14.923 ¹⁸²	53.81 ¹⁷	6.81 ²⁰	3
Feb. 9.5	49.427 ¹¹⁴	43.63 ⁷⁵	35.489 ¹⁰³	49.05 ²⁸⁶	15.052 ¹²⁹	53.90 ⁹	6.92 ¹¹	3
	64	51	49	267	74	36	1	
19.5	49.491	43.12	35.538	51.72	15.126	54.26	6.93	4
Mar. 1.5	49.506 ¹⁵	42.84 ²⁸	35.537 ¹	54.15 ²⁴³	15.146 ²⁰	54.81 ⁵⁵	6.84 ⁹	4
11.4	49.476 ³⁰	42.76 ⁸	35.491 ⁴⁶	56.28 ²¹³	15.118 ²⁸	55.53 ⁷²	6.67 ¹⁷	4
21.4	49.409 ⁶⁷	42.85 ⁹	35.405 ⁸⁶	58.12 ¹⁸⁴	15.048 ⁷⁰	56.33 ⁸⁰	6.44 ²³	5
31.4	49.312 ⁹⁷	43.09 ²⁴	35.289 ¹¹⁶	59.61 ¹⁴⁹	14.944 ¹⁰⁴	57.18 ⁸⁵	6.13 ³¹	5
	120	33	140	115	129	85	35	
Apr. 10.4	49.192	43.42	35.149	60.76	14.815	58.03	5.78	5
20.3	49.059 ¹³³	43.83 ⁴¹	34.995 ¹⁵⁴	61.55 ⁷⁹	14.671 ¹⁴⁴	58.82 ⁷⁹	5.39 ³⁹	5
30.3	48.921 ¹³⁸	44.29 ⁴⁶	34.833 ¹⁶²	61.99 ⁴⁴	14.519 ¹⁵²	59.52 ⁷⁰	4.98 ⁴¹	6
May 10.3	48.785 ¹³⁶	44.77 ⁴⁸	34.670 ¹⁶³	62.06 ⁷	14.368 ¹⁵¹	60.12 ⁶⁰	4.55 ⁴³	6
20.2	48.656 ¹²⁹	45.25 ⁴⁸	34.512 ¹⁵⁸	61.79 ²⁷	14.225 ¹⁴³	60.58 ⁴⁶	4.12 ⁴³	6
	114	48	147	61	129	31	42	
30.2	48.542	45.73	34.365	61.18	14.096	60.89	3.70	6
June 9.2	48.444 ⁹⁸	46.18 ⁴⁵	34.234 ¹⁸¹	60.27 ⁹¹	13.986 ¹¹⁰	61.05 ¹⁶	3.30 ⁴⁰	6
19.2	48.368 ⁷⁶	46.60 ⁴²	34.121 ¹¹³	59.06 ¹²¹	13.897 ⁸⁹	61.05 ⁰	2.93 ³⁷	5
29.1	48.313 ⁵⁵	46.98 ³⁸	34.031 ⁹⁰	57.60 ¹⁴⁶	13.833 ⁶⁴	60.90 ¹⁵	2.59 ³⁴	5
July 9.1	48.283 ³⁰	47.31 ³³	33.965 ⁶⁶	55.92 ¹⁶⁸	13.795 ³⁸	60.58 ³²	2.31 ²⁸	5
	6	23	40	184	10	45	22	
19.1	48.277	47.54	33.925	54.08	13.785	60.13	2.09	5
29.1	48.298 ²¹	47.70 ¹⁶	33.915 ¹⁰	52.15 ¹⁹³	13.802 ¹⁷	59.52 ⁶¹	1.93 ¹⁶	5
Aug. 8.0	48.345 ⁴⁷	47.75 ⁵	33.935 ²⁰	50.17 ¹⁹⁸	13.848 ⁴⁶	58.75 ⁷⁷	1.85 ⁸	4
18.0	48.420 ⁷⁵	47.67 ⁸	33.988 ⁵³	48.24 ¹⁹³	13.924 ⁷⁶	57.84 ⁹¹	1.84 ¹	4
28.0	48.524 ¹⁰⁴	47.43 ²⁴	34.075 ⁸⁷	46.41 ¹⁸³	14.031 ¹⁰⁷	56.77 ¹⁰⁷	1.92 ⁸	4
	131	41	123	163	136	122	15	
Sept. 6.9	48.655	47.02	34.198	44.78	14.167	55.55	2.07	3
16.9	48.816 ¹⁶¹	46.41 ⁶¹	34.357 ¹⁵⁹	43.41 ¹³⁷	14.336 ¹⁶⁹	54.19 ¹³⁶	2.31 ²⁴	3
26.9	49.007 ¹⁹¹	45.59 ⁸²	34.553 ¹⁹⁶	42.40 ¹⁰¹	14.537 ²⁰¹	52.69 ¹⁵⁰	2.64 ³³	3
Oct. 6.9	49.228 ²²¹	44.56 ¹⁰³	34.783 ²³⁰	41.78 ⁶²	14.768 ²³¹	51.06 ¹⁶³	3.06 ⁴²	3
16.8	49.478 ²⁵⁰	43.31 ¹²⁵	35.048 ²⁶⁵	41.62 ¹⁶	15.031 ²⁶³	49.33 ¹⁷³	3.53 ⁴⁷	3
	276	144	295	32	291	179	53	
26.8	49.754	41.87	35.343	41.94	15.322	47.54	4.06	3
Nov. 5.8	50.052 ²⁹⁸	40.25 ¹⁶²	35.661 ³¹⁸	42.76 ⁸²	15.638 ³¹⁶	45.70 ¹⁸⁴	4.64 ⁵⁸	2
15.8	50.367 ³¹⁵	38.50 ¹⁷⁵	35.996 ³³⁵	44.07 ¹³¹	15.972 ³³⁴	43.89 ¹⁸¹	5.23 ⁵⁹	3
25.7	50.692 ³²⁵	36.67 ¹⁸³	36.340 ³⁴⁴	45.83 ¹⁷⁶	16.318 ³⁴⁶	42.14 ¹⁷⁵	5.84 ⁶¹	3
Dec. 5.7	51.019 ³²⁷	34.81 ¹⁸⁶	36.682 ³⁴²	47.99 ²¹⁶	16.667 ³⁴⁹	40.52 ¹⁶²	6.43 ⁵⁹	3
	318	182	330	251	341	144	56	
15.7	51.337	32.99	37.012	50.50	17.008	39.08	6.99	3
25.6	51.637 ³⁰⁰	31.27 ¹⁷²	37.318 ³⁰⁶	53.26 ²⁷⁶	17.332 ³²⁴	37.87 ¹²¹	7.49 ⁵⁰	3
35.6	51.909 ²⁷²	29.70 ¹⁵⁷	37.592 ²⁷⁴	56.19 ²⁹³	17.626 ²⁹⁴	36.92 ⁹⁵	7.92 ⁴³	4
Mean Place	46.575	57.96	32.753	36.67	12.003	68.52	3.190	2
Sec δ, Tan δ	1.016	+0.181	1.126	-0.518	1.096	+0.448	2.340	-
Dψ a, Dω a	+0.06	+0.01	+0.05	-0.03	+0.07	+0.02	+0.03	-
Dψ δ, Dω δ	-0.3	+0.6	-0.3	+0.6	-0.3	+0.6	-0.3	+

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	υ Ursa Majoris. Mag. 3.9		6 Sextantis. Mag. 6.0		μ Leonis. Mag. 4.1		Groombridge 1586. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 45 s	° ' " +59 24 "	h m 9 47 s	° ' " - 3 51 "	h m 9 48 s	° ' " +26 23 "	h m 9 51 s	° ' " +73 15 "
Jan. 0.6	13.647	71.08	8.150	36.84	8.394	23.59	10.02	51.58
10.6	14.083 ⁴³⁶	72.00 ⁹²	8.402 ²⁵²	38.99 ²¹⁵	8.679 ²⁸⁵	22.89 ⁷⁰	10.72 ⁷⁰	52.99 ¹⁴¹
20.6	14.448 ³⁶⁵	73.36 ¹³⁶	8.614 ²¹²	41.02 ²⁰³	8.920 ²⁴¹	22.49 ⁴⁰	11.32 ⁶⁰	54.87 ¹⁸⁸
30.6	14.730 ²⁸²	75.10 ¹⁷⁴	8.781 ¹⁶⁷	42.86 ¹⁸⁴	9.112 ¹⁹²	22.41 ⁸	11.78 ⁴⁶	57.15 ²²⁸
Feb. 9.5	14.924 ¹⁹⁴	77.14 ²⁰⁴	8.898 ¹¹⁷	44.49 ¹⁶³	9.249 ¹³⁷	22.64 ²³	12.07 ²⁹	59.73 ²⁵⁸
19.5	15.024 ¹⁰⁰	79.38 ²²⁴	8.967 ⁶⁹	45.90 ¹⁴¹	9.331 ⁸²	23.11 ⁴⁷	12.22 ¹⁵	62.48 ²⁷⁵
Mar. 1.5	15.032 ⁸	81.74 ²³⁶	8.988 ²¹	47.04 ¹¹⁴	9.359 ²⁸	23.80 ⁶⁹	12.22 ⁰	65.31 ²⁸³
11.4	14.953 ⁷⁹	84.09 ²³⁵	8.966 ²²	47.94 ⁹⁰	9.337 ²²	24.63 ⁸³	12.05 ¹⁷	68.09 ²⁷⁸
21.4	14.797 ¹⁵⁶	86.34 ²²⁵	8.907 ⁵⁹	48.59 ⁶⁵	9.271 ⁶⁶	25.57 ⁹⁴	11.75 ³⁰	70.69 ²⁶⁰
31.4	14.577 ²²⁰	88.38 ²⁰⁴	8.818 ⁸⁹	49.03 ⁴⁴	9.171 ¹⁰⁰	26.54 ⁹⁷	11.34 ⁴¹	73.03 ²³⁴
Apr. 10.4	14.305 ²⁷²	90.13 ¹⁷⁵	8.707 ¹¹¹	49.24 ²¹	9.042 ¹²⁰	27.49 ⁹⁵	10.83 ⁵¹	75.00 ¹⁹⁷
20.3	13.998 ³⁰⁷	91.56 ¹⁴³	8.582 ¹²⁵	49.27 ³	8.896 ¹⁴⁶	28.38 ⁸⁹	10.25 ⁵⁸	76.53 ¹⁵³
30.3	13.672 ³²⁶	92.57 ¹⁰¹	8.450 ¹³²	49.12 ¹⁵	8.743 ¹⁵³	29.16 ⁷⁸	9.62 ⁶³	77.58 ¹⁰⁵
May 10.3	13.341 ³³¹	93.15 ⁵⁸	8.318 ¹³²	48.81 ³¹	8.588 ¹⁵⁵	29.80 ⁶⁴	8.98 ⁶⁴	78.10 ⁵²
20.2	13.019 ³²²	93.29 ¹⁴	8.191 ¹²⁷	48.36 ⁴⁵	8.440 ¹⁴⁸	30.29 ⁴⁹	8.34 ⁶⁴	78.09 ¹
30.2	12.718 ³⁰¹	92.99 ³⁰	8.077 ¹¹⁴	47.78 ⁵⁸	8.305 ¹³⁵	30.59 ³⁰	7.74 ⁶⁰	77.56 ⁵³
June 9.2	12.448 ²⁷⁰	92.25 ⁷⁴	7.975 ¹⁰²	47.09 ⁶⁹	8.189 ¹¹⁶	30.73 ¹⁴	7.18 ⁵⁶	76.53 ¹⁰³
19.2	12.217 ²³¹	91.10 ¹¹⁵	7.892 ⁸³	46.31 ⁷⁸	8.093 ⁹⁶	30.69 ⁴	6.68 ⁵⁰	75.02 ¹⁵¹
29.1	12.031 ¹⁸⁶	89.57 ¹⁵³	7.829 ⁶³	45.45 ⁸⁶	8.022 ⁷¹	30.46 ²³	6.27 ⁴¹	73.07 ¹⁹⁵
July 9.1	11.895 ¹³⁶	87.71 ¹⁸⁶	7.787 ⁴²	44.57 ⁸⁸	7.976 ⁴⁶	30.08 ³⁸	5.94 ³³	70.75 ²³²
19.1	11.812 ⁸³	85.54 ²¹⁷	7.769 ¹⁸	43.66 ⁹¹	7.958 ¹⁸	29.52 ⁵⁶	5.70 ²⁴	68.09 ²⁶⁶
29.1	11.785 ²⁷	83.14 ²⁴⁰	7.775 ⁶	42.77 ⁸⁹	7.968 ¹⁰	28.78 ⁷⁴	5.58 ¹²	65.16 ²⁹³
Aug. 8.0	11.815 ³⁰	80.52 ²⁶²	7.807 ³²	41.94 ⁸³	8.006 ³⁸	27.88 ⁹⁰	5.56 ²	62.02 ³¹⁴
18.0	11.903 ⁸⁸	77.75 ²⁷⁷	7.866 ⁵⁹	41.23 ⁷¹	8.076 ⁷⁰	26.83 ¹⁰⁵	5.64 ⁸	58.75 ³²⁷
28.0	12.049 ¹⁴⁶	74.89 ²⁸⁶	7.953 ⁸⁷	40.65 ⁵⁸	8.175 ⁹⁹	25.62 ¹²¹	5.83 ¹⁹	55.40 ³³⁵
Sept. 6.9	12.252 ²⁰³	71.97 ²⁹²	8.070 ¹¹⁷	40.26 ³⁹	8.306 ¹³¹	24.26 ¹³⁶	6.13 ³⁰	52.03 ³³⁷
16.9	12.511 ²⁵⁹	69.06 ²⁹¹	8.216 ¹⁴⁶	40.11 ¹⁵	8.471 ¹⁶⁵	22.76 ¹⁵⁰	6.53 ⁴⁰	48.71 ³³²
26.9	12.827 ³¹⁶	66.20 ²⁸⁶	8.395 ¹⁷⁹	40.23 ¹²	8.667 ¹⁹⁶	21.12 ¹⁶⁴	7.03 ⁵⁰	45.51 ³²⁰
Oct. 6.9	13.196 ³⁶⁹	63.45 ²⁷⁵	8.605 ²¹⁰	40.64 ⁴¹	8.895 ²²⁸	19.37 ¹⁷⁵	7.62 ⁵⁹	42.51 ³⁰⁰
16.8	13.617 ⁴²¹	60.88 ²⁵⁷	8.845 ²⁴⁰	41.38 ⁷⁴	9.156 ²⁶¹	17.54 ¹⁸³	8.30 ⁶⁸	39.75 ²⁷⁶
26.8	14.083 ⁴⁶⁶	58.53 ²³⁵	9.113 ²⁶⁸	42.43 ¹⁰⁵	9.445 ²⁸⁹	15.65 ¹⁸⁹	9.07 ⁷⁷	37.32 ²⁴³
Nov. 5.8	14.588 ⁵⁰⁵	56.49 ²⁰⁴	9.403 ²⁹⁰	43.78 ¹³⁵	9.762 ³¹⁷	13.75 ¹⁹⁰	9.90 ⁸³	35.27 ²⁰⁵
15.8	15.123 ⁵³⁵	54.79 ¹⁷⁰	9.713 ³¹⁰	45.42 ¹⁶⁴	10.098 ³³⁶	11.88 ¹⁸⁷	10.77 ⁸⁷	33.67 ¹⁶⁰
25.7	15.674 ⁵⁵¹	53.50 ¹²⁹	10.033 ³²⁰	47.29 ¹⁸⁷	10.448 ³⁵⁰	10.11 ¹⁷⁷	11.67 ⁹⁰	32.56 ¹¹¹
Dec. 5.7	16.229 ⁵⁵⁵	52.66 ⁸⁴	10.356 ³²³	49.33 ²⁰⁴	10.802 ³⁵⁴	8.49 ¹⁶²	12.57 ⁹⁰	31.99 ⁵⁷
15.7	16.772 ⁵⁴³	52.31 ³⁵	10.670 ³¹⁴	51.50 ²¹⁷	11.150 ³⁴⁸	7.06 ¹⁴³	13.46 ⁸⁹	31.99 ⁰
25.6	17.286 ⁵¹⁴	52.45 ¹⁴	10.968 ²⁹⁸	53.71 ²²¹	11.481 ³³¹	5.89 ¹¹⁷	14.30 ⁸⁴	32.55 ⁵⁶
35.6	17.755 ⁴⁶⁹	53.09 ⁶⁴	11.240 ²⁷²	55.89 ²¹⁸	11.785 ³⁰⁴	5.00 ⁸⁹	15.06 ⁷⁶	33.64 ¹⁰⁹
Mean Place	10.324	90.68	6.161	30.38	6.172	37.64	5.021	72.74
Sec δ, Tan δ	1.966	+1.692	1.002	-0.067	1.116	+0.496	3.473	+3.326
D _φ α, D _α α	+0.09	+0.09	+0.06	0.00	+0.07	+0.03	+0.11	+0.19
D _φ δ, D _α δ	-0.3	+0.6	-0.3	+0.5	-0.3	+0.5	-0.3	+0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	19 Leonis Minoris. Mag. 5.2		φ Argus. Mag. 3.7		π Leonis. Mag. 4.9		η Leonis. Mag. 3.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 52 s	° ' +41 26 "	h m 9 53 s	° ' -54 10 "	h m 9 55 s	° ' + 8 25 "	h m 10 2 s	° ' +17 9 "
Jan. 0.6	42.562	31.22	61.145	32.69	54.898	67.61	53.806	34.70
10.6	42.893 331	31.22 0	61.474 329	36.12 343	55.164 266	66.00 161	54.086 280	33.47 123
20.6	43.173 280	31.63 41	61.739 265	39.76 364	55.390 226	64.58 142	54.327 241	32.50 97
30.6	43.397 224	32.41 78	61.932 198	43.52 376	55.571 181	63.41 117	54.522 195	31.83 67
Feb. 9.5	43.559 162	33.50 109	62.053 121	47.28 376	55.704 133	62.51 90	54.667 145	31.43 40
	96	134	48	367	82	65	92	11
19.5	43.655	34.84	62.101	50.95	55.786	61.86	54.759	31.32
Mar. 1.5	43.687 32	36.37 153	62.078 23	54.45 350	55.820 34	61.45 41	54.802 43	31.45 13
11.4	43.659 28	38.00 163	61.992 86	57.72 327	55.809 11	61.27 18	54.797 5	31.78 33
21.4	43.578 81	39.64 164	61.848 144	60.67 205	55.759 50	61.27 0	54.753 44	32.27 49
31.4	43.453 125	41.22 158	61.659 189	63.26 269	55.677 82	61.44 17	54.672 81	32.87 60
	160	144	229	218	106	30	106	66
Apr. 10.4	43.293	42.66	61.430	65.44	55.572	61.74	54.566	33.53
20.3	43.111 182	43.91 125	61.173 257	67.19 175	55.450 122	62.13 39	54.441 125	34.22 69
30.3	42.916 195	44.92 101	60.898 276	68.46 127	55.320 180	62.58 45	54.308 133	34.90 68
May 10.3	42.718 198	45.65 73	60.614 284	69.25 79	55.189 131	63.07 49	54.172 136	35.53 63
20.3	42.526 192	46.08 43	60.329 285	69.54 29	55.063 126	63.59 52	54.040 132	36.10 57
	179	12	273	21	115	52	122	43
30.2	42.347	46.20	60.051	69.33	54.948	64.11	53.918	36.58
June 9.2	42.190 157	46.00 20	59.788 263	68.64 69	54.846 102	64.62 51	53.809 109	36.96 38
19.2	42.057 133	45.51 49	59.545 243	67.49 115	54.761 85	65.11 49	53.717 92	37.23 27
29.1	41.954 103	44.71 80	59.331 214	65.91 158	54.696 65	65.56 45	53.645 72	37.40 17
July 9.1	41.882 72	43.65 106	59.150 181	63.95 196	54.652 44	65.95 39	53.595 50	37.44 4
	39	129	143	228	20	33	27	8
19.1	41.843	42.36	59.007	61.67	54.632	66.28	53.568	37.36
29.1	41.838 5	40.84 152	58.910 97	59.12 255	54.635 3	66.52 24	53.565 3	37.13 23
Aug. 8.0	41.870 32	39.10 174	58.862 48	56.41 271	54.663 28	66.65 13	53.590 25	36.76 37
18.0	41.938 68	37.21 189	58.868 6	53.61 280	54.719 56	66.65 0	53.640 50	36.24 52
28.0	42.044 106	35.16 205	58.932 64	50.83 278	54.801 82	66.49 16	53.719 79	35.55 69
	143	217	123	265	112	34	110	87
Sept. 7.0	42.187	32.99	59.055	48.18	54.913	66.15	53.829	34.68
16.9	42.369 182	30.74 225	59.240 185	45.74 244	55.055 142	65.61 54	53.968 139	33.64 104
26.9	42.590 221	28.44 230	59.484 244	43.63 211	55.229 174	64.84 77	54.141 173	32.41 123
Oct. 6.9	42.850 260	26.12 232	59.785 301	41.95 168	55.434 205	63.86 98	54.345 204	31.00 141
16.8	43.147 297	23.82 230	60.140 355	40.78 117	55.670 236	62.63 123	54.583 238	29.41 159
	330	222	401	61	265	143	267	171
26.8	43.477	21.60	60.541	40.17	55.935	61.20	54.850	27.70
Nov. 5.8	43.839 362	19.52 208	60.977 436	40.18 1	56.225 290	59.56 164	55.145 295	25.87 183
15.8	44.223 384	17.62 190	61.436 459	40.81 63	56.535 310	57.77 179	55.461 316	23.97 190
25.7	44.624 401	15.97 165	61.906 470	42.06 125	56.859 324	55.88 189	55.793 332	22.06 191
Dec. 5.7	45.032 408	14.61 136	62.372 466	43.93 187	57.187 328	53.94 194	56.131 338	20.20 196
	401	101	444	239	323	192	335	176
15.7	45.433	13.60	62.816	46.32	57.510	52.02	56.466	18.44
25.7	45.815 382	12.97 63	63.226 410	49.17 285	57.817 307	50.17 185	56.787 321	16.86 158
35.6	46.167 352	12.75 22	63.590 364	52.40 323	58.100 283	48.46 171	57.083 296	15.46 140
Mean Place	40.082	48.59	58.862	38.22	52.892	77.49	51.769	47.06
Sec δ, Tan δ	1.334	+0.883	1.709	-1.386	1.011	+0.148	1.047	+0.309
Dφ α, Dω α	+0.07	+0.05	+0.04	-0.08	+0.06	+0.0	+0.06	+0.02
Dφ δ, Dω δ	-0.3	+0.5	-0.3	+0.5	-0.3	+0.5	-0.3	+0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	30 H. Ursæ Majoris. Mag. 4.9		μ Hydræ. Mag. 4.1		31 Leonis Minoris. Mag. 4.4		α Antilæ. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 18 s	° ' " +65 58 "	h m 10 22 s	° ' " -16 25 "	h m 10 23 s	° ' " +37 7 "	h m 10 23 s	° ' " -30 38 "
Jan. 0.7	17.92	31.72	9.256	5.09	11.015	22.07	25.708	59.95
10.6	18.49 57	32.55 83	9.536 280	7.70 261	11.352 337	21.62 45	26.002 294	62.90 295
20.6	18.98 49	33.91 136	9.777 241	10.28 258	11.648 296	21.60 2	26.255 253	65.96 306
30.6	19.38 40	35.71 180	9.975 198	12.78 250	11.893 245	21.97 37	26.460 205	69.03 307
Feb. 9.5	19.68 30	37.89 218	10.125 150	15.14 236	12.081 188	22.70 73	26.613 153	72.03 300
	18	244	100	215	130	104	101	287
19.5	19.86	40.33	10.225	17.29	12.211	23.74	26.714	74.90
Mar. 1.5	19.93 7	42.96 263	10.278 53	19.23 194	12.280 69	25.04 130	26.762 48	77.57 267
11.5	19.90 3	45.62 266	10.286 8	20.90 167	12.291 11	26.50 146	26.763 1	80.01 244
21.4	19.76 14	48.22 260	10.255 31	22.31 141	12.251 40	28.05 155	26.721 42	82.15 214
31.4	19.52 24	50.65 243	10.190 65	23.43 112	12.166 85	29.61 156	26.643 78	84.00 185
	30	216	91	85	122	151	107	150
Apr. 10.4	19.22	52.81	10.099	24.28	12.044	31.12	26.536	85.50
20.4	18.86 36	54.62 181	9.990 109	24.85 57	11.897 147	32.49 137	26.407 129	86.66 116
30.3	18.46 40	56.02 140	9.866 124	25.16 31	11.732 165	33.68 119	26.264 143	86.66 80
May 10.3	18.04 42	56.96 94	9.738 128	25.21 5	11.559 173	34.65 97	26.112 152	87.46 45
20.3	17.62 42	57.42 46	9.608 130	25.00 21	11.387 172	35.35 70	25.958 154	87.91 9
	41	4	125	43	166	44	151	27
30.2	17.21	57.38	9.483	24.57	11.221	35.79	25.807	87.73
June 9.2	16.82 39	56.85 53	9.367 116	23.90 67	11.067 154	35.92 13	25.663 144	87.13 60
19.2	16.46 36	55.84 101	9.262 105	23.05 85	10.931 136	35.76 16	25.530 133	87.13 92
29.2	16.15 31	54.39 145	9.171 91	22.02 103	10.817 114	35.33 43	25.413 117	86.21 122
July 9.1	15.91 24	52.54 185	9.098 73	20.83 119	10.726 91	34.60 73	25.313 100	84.99 147
	20	223	54	128	63	98	77	169
19.1	15.71 13	50.31	9.044 32	19.55 135	10.663 34	33.62 123	25.236 54	81.83 184
29.1	15.58 7	47.76 255	9.012 8	18.20 137	10.629 5	32.39 145	25.182 24	79.99 184
Aug. 8.1	15.51 1	44.96 280	9.004 20	16.83 133	10.624 28	30.94 168	25.158 6	78.04 195
18.0	15.52 8	41.95 301	9.024 48	15.50 122	10.652 62	29.26 185	25.164 41	76.07 197
28.0	15.60 15	38.79 325	9.072 80	14.28 107	10.714 97	27.41 202	25.205 77	74.15 192
								180
Sept. 7.0	15.75	35.54	9.152	13.21	10.811	25.39	25.282	72.35
16.9	15.99 24	32.26 328	9.267 115	12.36 85	10.946 135	23.22 217	25.399 117	70.77 158
26.9	16.29 30	29.01 325	9.417 150	11.79 57	11.120 174	20.95 227	25.557 158	69.48 129
Oct. 6.9	16.67 38	25.86 315	9.602 185	11.55 24	11.333 213	18.60 235	25.757 200	68.54 94
16.9	17.11 44	22.89 297	9.823 221	11.69 14	11.585 252	16.21 239	25.996 239	68.02 52
	51	275	256	52	290	237	276	5
26.8	17.62	20.14	10.079	12.21	11.875	13.84	26.272	67.97
Nov. 5.8	18.19 57	17.71 243	10.363 284	13.13 92	12.198 323	11.53 231	26.582 310	68.41 44
15.8	18.80 61	15.66 205	10.673 310	14.45 132	12.551 353	9.36 217	26.916 334	68.41 95
25.8	19.45 65	14.04 162	10.999 326	16.13 168	12.925 374	7.37 199	27.269 353	69.36 142
Dec. 5.7	20.12 67	12.91 113	11.333 334	18.14 201	13.312 387	5.64 173	27.628 359	70.78 187
	66	59	331	225	387	143	354	227
15.7	20.78	12.32	11.664	20.39	13.699	4.21	27.982	74.92
25.7	21.42 64	12.28 4	11.983 319	22.83 244	14.077 378	3.14 107	28.322 340	77.51 259
35.6	22.02 60	12.80 52	12.278 295	25.38 255	14.430 353	2.47 67	28.634 312	80.33 282
Mean Place	14.521	54.11	7.437	1.99	8.856	40.02	23.857	60.86
Sec δ, Tan δ	2.457	+2.244	1.043	-0.295	1.254	+0.757	1.163	-0.593
D _⊙ α, D _∞ α	+0.09	+0.14	+0.06	-0.02	+0.07	+0.05	+0.05	-0.04
D _⊙ δ, D _∞ δ	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	36 Ursæ Majoris. Mag. 4.8		9 H. Draconis. Mag. 5.0		ρ Leonis. Mag. 3.8		33 Sextantis. Mag. 6.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 25	° ' +56 23	h m 10 28	° ' +76 7	h m 10 28	° ' + 9 43	h m 10 37	° ' - 1 18
	s	"	s	"	s	"	s	"
Jan. 0.7	26.111	43.73	14.71	45.89	31.566	33.53	15.649	43.38
10.6	26.559 ⁴⁴⁸	44.11 ³⁸	15.62 ⁹¹	46.96 ¹⁰⁷	31.854 ²⁸⁸	31.87 ¹⁶⁶	15.937 ²⁸⁸	45.47 ²⁰⁹
20.6	26.951 ³⁹²	44.99 ⁸⁸	16.42 ⁸⁰	48.58 ¹⁶²	32.107 ²⁵³	30.43 ¹⁴⁴	16.190 ²⁵³	47.45 ¹⁹⁸
30.6	27.275 ³²⁴	46.32 ¹³³	17.07 ⁶⁵	50.68 ²¹⁰	32.318 ²¹¹	29.25 ¹¹⁸	16.402 ²¹²	49.23 ¹⁷⁸
Feb. 9.6	27.521 ²⁴⁶	48.05 ¹⁷⁸	17.55 ⁴⁸	53.16 ²⁴⁸	32.483 ¹⁶⁵	28.34 ⁹¹	16.569 ¹⁶⁷	50.78 ¹⁵⁵
	165	204	30	275	116	61	120	132
19.5	27.686	50.09	17.85	55.91	32.599	27.73	16.689	52.10
Mar. 1.5	27.766 ⁸⁰	52.33 ²²⁴	17.96 ¹¹	58.82 ²⁹¹	32.666 ⁶⁷	27.37 ³⁶	16.762 ⁷³	53.14 ¹⁰⁴
11.5	27.763 ³	54.68 ²³⁵	17.90 ⁶	61.76 ²⁹⁴	32.688 ²²	27.26 ¹¹	16.791 ²⁹	53.94 ⁸⁰
21.4	27.687 ⁷⁶	57.03 ²³⁵	17.67 ²³	64.62 ²⁸⁶	32.669 ¹⁹	27.35 ⁹	16.779 ¹²	54.50 ⁵⁶
31.4	27.542 ¹⁴⁵	59.28 ²²⁵	17.26 ⁴¹	67.27 ²⁶⁵	32.615 ⁵⁴	27.62 ²⁷	16.734 ⁴⁵	54.83 ³³
	198	205	52	235	82	40	73	13
Apr. 10.4	27.344	61.33	16.74	69.62	32.533	28.02	16.661	54.96
20.4	27.104 ²⁴⁰	63.11 ¹⁷⁸	16.10 ⁶⁴	71.57 ¹⁹⁵	32.431 ¹⁰²	28.52 ⁵⁰	16.569 ⁹²	54.92 ⁴
30.3	26.834 ²⁷⁰	64.57 ¹⁴⁶	15.39 ⁷¹	73.06 ¹⁴⁹	32.316 ¹¹⁵	29.08 ⁵⁶	16.462 ¹⁰⁷	54.71 ²¹
May 10.3	26.549 ²⁸⁵	65.62 ¹⁰⁵	14.63 ⁷⁶	74.04 ⁹⁸	32.194 ¹²²	29.66 ⁵⁸	16.348 ¹¹⁴	54.37 ³⁴
20.3	26.261 ²⁸⁸	66.27 ⁶⁵	13.84 ⁷⁹	74.48 ⁴⁴	32.072 ¹²²	30.25 ⁵⁹	16.232 ¹¹⁶	53.94 ⁴³
	282	20	77	11	116	58	114	53
30.3	25.979	66.47	13.07	74.37	31.956	30.83	16.118	53.41
June 9.2	25.715 ²⁶⁴	66.24 ²³	12.32 ⁷⁵	73.73 ⁶⁴	31.848 ¹⁰⁸	31.38 ⁵⁵	16.011 ¹⁰⁷	52.80 ⁶¹
19.2	25.474 ²⁴¹	65.57 ⁶⁷	11.63 ⁶⁹	72.56 ¹¹⁷	31.751 ⁹⁷	31.87 ⁴⁹	15.914 ⁹⁷	52.14 ⁶⁶
29.2	25.266 ²⁰⁸	64.50 ¹⁰⁷	11.01 ⁶²	70.91 ¹⁶⁵	31.670 ⁸¹	32.31 ⁴⁴	15.829 ⁸⁵	51.43 ⁷¹
July 9.1	25.094 ¹⁷²	63.05 ¹⁴⁵	10.48 ⁵³	68.80 ²¹¹	31.607 ⁶³	32.68 ³⁷	15.760 ⁶⁹	50.71 ⁷²
	130	180	42	249	45	26	53	66
19.1	24.964 ⁸⁷	61.25 ²¹²	10.06 ³²	66.31 ²⁸²	31.562 ²³	32.94 ¹⁶	15.707 ³²	50.02 ⁶⁴
29.1	24.877 ³⁹	59.13 ²³⁹	9.74 ²¹	63.49 ³¹²	31.539 ¹	33.10 ⁴	15.675 ¹²	49.34 ⁶¹
Aug. 8.1	24.838 ¹¹	56.74 ²⁶²	9.53 ⁸	60.37 ³³²	31.538 ²⁵	33.14 ¹⁰	15.663 ¹³	48.73 ⁵⁰
18.0	24.849 ⁶²	54.12 ²⁷⁹	9.45 ⁶	57.05 ³⁴⁸	31.563 ⁵⁰	33.04 ²⁸	15.676 ³⁸	48.23 ³⁷
28.0	24.911 ¹¹⁴	51.33 ²⁹²	9.51 ¹⁷	53.57 ³⁵⁴	31.613 ⁸⁰	32.76 ⁴⁵	15.714 ⁶⁹	47.86 ¹⁹
Sept. 7.0	25.025	48.41	9.68	50.03	31.693	32.31	15.783	47.67
17.0	25.193 ¹⁶⁸	45.41 ³⁰⁰	9.99 ³¹	46.47 ³⁵⁶	31.804 ¹¹¹	31.64 ⁶⁷	15.882 ⁹⁹	47.69 ²
26.9	25.417 ²²⁴	42.39 ³⁰²	10.42 ⁴³	42.98 ³⁴⁹	31.947 ¹⁴³	30.76 ⁸⁸	16.015 ¹³³	47.96 ²⁷
Oct. 6.9	25.696 ²⁷⁹	39.40 ²⁹⁹	10.99 ⁵⁷	39.62 ³³⁶	32.125 ¹⁷⁸	29.65 ¹¹¹	16.183 ¹⁶⁸	48.49 ⁵³
16.9	26.028 ³³²	36.50 ²⁹⁰	11.66 ⁶⁷	36.47 ³¹⁵	32.337 ²¹²	28.33 ¹³²	16.386 ²⁰³	49.31 ⁸²
	383	274	79	286	244	155	237	112
26.8	26.411	33.76	12.45	33.61	32.581	26.78	16.623	50.43
Nov. 5.8	26.840 ⁴²⁹	31.26 ²⁵⁰	13.33 ⁸⁸	31.10 ²⁵¹	32.855 ²⁷⁴	25.06 ¹⁷²	16.890 ²⁶⁷	51.82 ¹³⁹
15.8	27.307 ⁴⁶⁷	29.05 ²²¹	14.30 ⁹⁷	29.02 ²⁰⁸	33.156 ³⁰¹	23.18 ¹⁸⁸	17.185 ²⁹⁵	53.48 ¹⁶⁶
25.8	27.804 ⁴⁹⁷	27.20 ¹⁸⁵	15.32 ¹⁰²	27.44 ¹⁵⁸	33.475 ³¹⁹	21.20 ¹⁹⁸	17.499 ³¹⁴	55.35 ¹⁸⁷
Dec. 5.7	28.316 ⁵¹²	25.78 ¹⁴²	16.37 ¹⁰⁵	26.39 ¹⁰⁵	33.804 ³²⁹	19.18 ²⁰²	17.824 ³²⁵	57.39 ²⁰⁴
	515	95	105	45	331	200	328	215
15.7	28.831	24.83	17.42	25.94	34.135	17.18	18.152	59.54
25.7	29.332 ⁵⁰¹	24.39 ⁴⁴	18.45 ¹⁰³	26.09 ¹⁵	34.458 ⁸²³	15.27 ¹⁹¹	18.471 ³¹⁹	61.71 ²¹⁷
35.7	29.803 ⁴⁷¹	24.48 ⁹	19.40 ⁹⁵	26.83 ⁷⁴	34.759 ⁸⁰¹	13.50 ¹⁷⁷	18.771 ³⁰⁰	63.84 ²¹³
Mean Place	23.431	65.36	9.927	69.58	29.720	44.46	13.889	35.65
Sec δ, Tan δ	1.807	+1.505	4.171	+4.050	1.015	+0.171	1.000	-0.023
Dψ _a , Dω _a	+0.08	+0.09	+0.10	+0.25	+0.06	+0.01	+0.06	0.00
Dψ _δ , Dω _δ	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Argus. Mag. 2.8		γ Leonis. Mag. 5.3		δ^2 Chamaeleon. Mag. 4.6		ν Hydræ. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 43 s	° ' -48 59 "	h m 10 44 s	° ' +10 58 "	h m 10 44 s	° ' -80 6 "	h m 10 45 s	° ' -15 45 "
Jan. 0.7	16.248	7.10	58.704	34.05	65.66	16.89	36.356	53.69
10.6	16.615 ³⁶⁷	10.17 ³⁰⁷	59.002 ²⁹⁸	32.38 ¹⁶⁷	66.73 ¹⁰⁷	19.70 ²⁸¹	36.651 ²⁹⁵	56.22 ²⁵³
20.6	16.932 ³¹⁷	13.48 ³³¹	59.268 ²⁶⁶	30.94 ¹⁴⁴	67.64 ⁹¹	22.94 ³²⁴	36.912 ²⁶¹	58.75 ²⁵³
30.6	17.193 ²⁶¹	16.97 ³⁴⁹	59.493 ²²⁵	29.80 ¹¹⁴	68.35 ⁷¹	26.52 ³⁵⁸	37.131 ²¹⁹	61.20 ²⁴⁵
Feb. 9.6	17.391 ¹⁹⁸	20.53 ³⁵⁶	59.674 ¹⁸¹	28.92 ⁸⁸	68.86 ⁵¹	30.31 ³⁷⁹	37.305 ¹⁷⁴	63.51 ²³¹
	134	353	132	56	28	394	126	212
19.5	17.525 ⁷²	24.06 ³⁴⁴	59.806 ⁸⁵	28.36 ²⁹	69.14 ⁹	34.25 ³⁹⁵	37.431 ⁸⁰	65.63 ¹⁹¹
Mar. 1.5	17.597 ¹²	27.50 ³²⁶	59.891 ³⁸	28.07 ⁵	69.23 ¹³	38.20 ³⁹¹	37.511 ³⁵	67.54 ¹⁶⁵
11.5	17.609 ⁴³	30.76 ³⁰¹	59.929 ³	28.02 ¹⁸	69.10 ³²	42.11 ³⁷⁷	37.546 ⁵	69.19 ¹⁴¹
21.5	17.566 ⁹¹	33.77 ²⁷²	59.926 ⁴⁰	28.20 ³⁵	68.78 ⁵⁰	45.88 ³⁵⁴	37.541 ⁴¹	70.60 ¹¹²
31.4	17.475 ¹³⁰	36.49 ²³⁹	59.886 ⁶⁹	28.55 ⁴⁹	68.28 ⁶⁷	49.42 ³²³	37.500 ⁷⁰	71.72 ⁸⁶
Apr. 10.4	17.345 ¹⁶⁴	38.88 ²⁰⁰	59.817 ⁹¹	29.04 ⁵⁷	67.61 ⁷⁹	52.65 ²⁸⁹	37.430 ⁹⁰	72.58 ⁶⁰
20.4	17.181 ¹⁸⁸	40.88 ¹⁶¹	59.726 ¹⁰⁶	29.61 ⁶⁴	66.82 ⁹¹	55.54 ²⁴⁶	37.340 ¹⁰⁷	73.18 ³⁴
30.3	16.993 ²⁰⁸	42.49 ¹¹⁵	59.620 ¹¹⁵	30.25 ⁶⁶	65.91 ¹⁰¹	58.00 ²⁰³	37.233 ¹¹⁷	73.52 ¹⁰
May 10.3	16.785 ²¹⁷	43.64 ⁷¹	59.505 ¹¹⁹	30.91 ⁶⁵	64.90 ¹⁰⁸	60.03 ¹⁵⁰	37.116 ¹²¹	73.62 ¹⁵
20.3	16.568 ²²²	44.35 ²⁵	59.386 ¹¹⁵	31.56 ⁶²	63.82 ¹¹²	61.53 ⁹⁵	36.995 ¹²⁰	73.47 ³⁵
30.3	16.346 ²²¹	44.60 ²¹	59.271 ¹¹¹	32.18 ⁵⁷	62.70 ¹¹⁵	62.48 ⁴⁵	36.875 ¹¹⁵	73.12 ⁵⁷
June 9.2	16.125 ²¹²	44.39 ⁶⁶	59.160 ¹⁰¹	32.75 ⁵¹	61.55 ¹¹¹	62.93 ¹⁵	36.760 ¹⁰⁸	72.55 ⁷⁷
19.2	15.913 ¹⁹⁹	43.73 ¹⁰⁸	59.059 ⁸⁸	33.26 ⁴²	60.44 ¹⁰⁸	62.78 ⁶⁷	36.652 ⁹⁷	71.78 ⁹²
29.2	15.714 ¹⁸¹	42.65 ¹⁴⁸	58.971 ⁷³	33.68 ³⁴	59.36 ¹⁰¹	62.11 ¹¹⁹	36.555 ⁸³	70.86 ¹⁰⁷
July 9.2	15.533 ¹⁵⁵	41.17 ¹⁸²	58.898 ⁵⁶	34.02 ²²	58.35 ⁹¹	60.92 ¹⁶⁹	36.472 ⁶⁸	69.79 ¹¹⁷
19.1	15.378 ¹²⁵	39.35 ²¹³	58.842 ³⁸	34.24 ¹¹	57.44 ⁷⁷	59.23 ²¹³	36.404 ⁴⁸	68.62 ¹²⁵
29.1	15.253 ⁸⁹	37.22 ²³⁴	58.804 ¹⁵	34.35 ³	56.67 ⁶¹	57.10 ²⁵¹	36.356 ²⁶	67.37 ¹²⁷
Aug. 8.1	15.164 ⁴⁸	34.88 ²⁵⁰	58.789 ⁸	34.32 ¹⁹	56.06 ⁴³	54.59 ²⁷⁷	36.330 ²	66.10 ¹²⁵
18.0	15.116 ¹	32.38 ²⁵⁶	58.797 ³⁵	34.13 ³⁶	55.63 ²²	51.82 ²⁹⁹	36.328 ²⁷	64.85 ¹¹³
28.0	15.115 ⁵¹	29.82 ²⁵²	58.832 ⁶³	33.77 ⁵⁴	55.41 ²	48.83 ³⁰⁹	36.355 ⁵⁷	63.67 ¹⁰³
Sept. 7.0	15.166 ¹⁰⁴	27.30 ²³⁹	58.895 ⁹⁴	33.23 ⁷⁶	55.39 ²³	45.74 ³⁰⁶	36.412 ⁹¹	62.64 ⁸²
17.0	15.270 ¹⁶²	24.91 ²¹⁴	58.989 ¹²⁸	32.47 ⁹⁷	55.62 ⁴⁴	42.68 ²⁸⁹	36.503 ¹²⁸	61.82 ⁵⁷
26.9	15.432 ²¹⁹	22.77 ¹⁸²	59.117 ¹⁶³	31.50 ¹²⁰	56.06 ⁶⁸	39.79 ²⁶⁶	36.631 ¹⁶⁵	61.25 ²⁷
Oct. 6.9	15.651 ²⁷⁵	20.95 ¹³⁹	59.280 ¹⁹⁹	30.30 ¹⁴¹	56.74 ⁸⁷	37.13 ²²⁵	36.796 ²⁰²	60.98 ⁹
16.9	15.926 ³²⁶	19.56 ⁹¹	59.479 ²³³	28.89 ¹⁶²	57.61 ¹⁰⁵	34.88 ¹⁸⁴	36.998 ²³⁹	61.07 ⁴⁵
26.9	16.252 ³⁷¹	18.65 ³⁵	59.712 ²⁶⁶	27.27 ¹⁸⁰	58.66 ¹²¹	33.04 ¹²⁵	37.237 ²⁷³	61.52 ⁸⁵
Nov. 5.8	16.623 ⁴⁰⁷	18.30 ²³	59.978 ²⁹⁵	25.47 ¹⁹⁴	59.87 ¹³²	31.79 ⁶⁵	37.510 ³⁰¹	62.37 ¹²⁴
15.8	17.030 ⁴³¹	18.53 ⁸¹	60.273 ³¹⁵	23.53 ²⁰³	61.19 ¹³⁷	31.14 ⁰	37.811 ³²¹	63.61 ¹⁵⁹
25.8	17.461 ⁴⁴¹	19.34 ¹⁴²	60.588 ³³⁰	21.50 ²⁰⁶	62.56 ¹⁴⁰	31.14 ⁶⁶	38.132 ³³⁴	65.20 ¹⁹¹
Dec. 5.7	17.902 ⁴³⁸	20.76 ¹⁹⁵	60.918 ³³³	19.44 ²⁰⁴	63.96 ¹³⁷	31.80 ¹³⁴	38.466 ³³⁶	67.11 ²¹⁷
15.7	18.340 ⁴²¹	22.71 ²⁴²	61.251 ³²⁸	17.40 ¹⁹⁴	65.33 ¹²⁸	33.14 ¹⁹⁵	38.802 ³²⁸	69.28 ²³⁶
25.7	18.761 ³⁸⁹	25.13 ²⁸²	61.579 ³¹⁰	15.46 ¹⁷⁸	66.61 ¹¹⁷	35.09 ²⁴⁶	39.130 ³⁰⁸	71.64 ²⁴⁹
35.7	19.150	27.95	61.889	13.68	67.78	37.55	39.438	74.13
Mean Place	14.332	12.95	56.942	45.65	61.608	27.63	34.649	50.45
Sec δ , Tan δ	1.524	-1.150	1.019	+0.194	5.823	-5.737	1.039	-0.282
$D\psi a, D_{\omega} a$	+0.05	-0.07	+0.06	+0.01	+0.01	-0.36	+0.06	-0.02
$D\psi \delta, D_{\omega} \delta$	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	46 Leonis Minoris. Mag. 3.9			54 Leonis. Mag. 4.5			1 Antilæ. Mag. 4.7			Groombridge 1708. Mag. 6.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	10	48	+34 38	10	51	+25 10	10	52	-36 41	10	53	+78 11
	s		"	s		"	s		"	s		"
Jan. 0.7	45.761		68.04 75	12.382		58.86 114	55.646		45.24 289	30.68		70.23 82
10.6	46.105 ⁸⁴⁴		67.29 33	12.705 ³²³		57.72 79	55.978 ³³²		48.13 289	31.77 ¹⁰⁹		71.05 82
20.6	46.413 ³⁰⁸		66.96 8	12.993 ²⁸⁸		56.93 43	56.269 ²⁹¹		51.22 309	32.75 ⁹⁸		72.46 141
30.6	46.677 ²⁶⁴		67.04 46	13.240 ²⁴⁷		56.50 6	56.515 ²⁴⁶		54.39 317	33.59 ⁸⁴		74.38 192
Feb. 9.6	46.890 ²¹³		67.50 83	13.440 ²⁰⁰		56.44 28	56.709 ¹⁹⁴		57.56 317	34.23 ⁶⁴		76.74 236
	156			148			140		311	45		270
19.5	47.046 ⁹⁸		68.33 112	13.588 ⁹⁶		56.72 56	56.849 ⁸⁶		60.67 296	34.68 ²⁴		79.44 291
Mar. 1.5	47.144 ⁴³		69.45 133	13.684 ⁴⁶		57.28 82	56.935 ³⁶		63.63 278	34.92 ³		82.35 301
11.5	47.187 ⁹		70.78 149	13.730 ¹		58.10 99	56.971 ¹¹		66.41 252	34.95 ¹⁸		85.36 298
21.5	47.178 ⁵³		72.27 154	13.729 ⁴²		59.09 111	56.960 ⁵⁰		68.93 223	34.77 ³⁷		88.34 283
31.4	47.125 ⁹¹		73.82 154	13.687 ⁷⁵		60.20 117	56.910 ⁸⁶		71.16 192	34.40 ⁵⁴		91.17 257
Apr. 10.4	47.034 ¹²¹		75.36 147	13.612 ¹⁰¹		61.37 116	56.824 ¹¹³		73.08 157	33.86 ⁶⁸		93.74 221
20.4	46.913 ¹⁴¹		76.83 133	13.511 ¹²¹		62.53 111	56.711 ¹³³		74.65 121	33.18 ⁸¹		95.95 177
30.3	46.772 ¹⁵⁵		78.16 112	13.390 ¹³¹		63.64 100	56.578 ¹⁴⁹		75.86 84	32.37 ⁸⁷		97.72 130
May 10.3	46.617 ¹⁵⁹		79.28 91	13.259 ¹³⁵		64.64 86	56.429 ¹⁵⁷		76.70 46	31.50 ⁹²		99.02 74
20.3	46.458 ¹⁵⁸		80.19 64	13.124 ¹³⁵		65.50 68	56.272 ¹⁶⁰		77.16 8	30.58 ⁹⁴		99.76 19
30.3	46.300 ¹⁵¹		80.83 38	12.989 ¹²⁹		66.18 50	56.112 ¹⁶⁰		77.24 31	29.64 ⁹²		99.95 36
June 9.2	46.149 ¹³⁸		81.21 8	12.860 ¹¹⁷		66.68 29	55.952 ¹⁵⁴		76.93 67	28.72 ⁸⁸		99.59 90
19.2	46.011 ¹²²		81.29 21	12.743 ¹⁰⁶		66.97 9	55.798 ¹⁴⁴		76.26 101	27.84 ⁸¹		98.69 144
29.2	45.889 ¹⁰⁵		81.08 48	12.637 ⁸⁹		67.06 14	55.654 ¹³⁰		75.25 133	27.03 ⁷¹		97.25 190
July 9.2	45.784 ⁸¹		80.60 78	12.548 ⁶⁹		66.92 34	55.524 ¹¹⁰		73.92 161	26.32 ⁶²		95.35 233
19.1	45.703 ⁵⁷		79.82 102	12.479 ⁴⁹		66.58 56	55.414 ⁹⁰		72.31 182	25.70 ⁵¹		93.02 272
29.1	45.646 ³⁰		78.80 128	12.430 ²⁵		66.02 78	55.324 ⁶²		70.49 199	25.19 ³⁷		90.30 306
Aug. 8.1	45.616 ³		77.52 151	12.405 ¹		65.24 98	55.262 ³¹		68.50 210	24.82 ²²		87.25 330
18.0	45.613 ³¹		76.01 173	12.404 ²⁹		64.26 119	55.231 ⁴		66.40 210	24.60 ⁹		83.95 349
28.0	45.644 ⁶⁴		74.28 192	12.433 ⁶⁰		63.07 139	55.235 ⁴³		64.30 205	24.51 ⁷		80.46 362
Sept. 7.0	45.708 ¹⁰⁰		72.36 211	12.493 ⁹¹		61.68 159	55.278 ⁸⁶		62.25 190	24.58 ²¹		76.84 368
17.0	45.808 ¹³⁸		70.25 224	12.584 ¹²⁸		60.09 177	55.364 ¹³²		60.35 165	24.79 ³⁷		73.16 364
26.9	45.946 ¹⁷⁹		68.01 236	12.712 ¹⁶⁵		58.32 192	55.496 ¹⁸¹		58.70 133	25.16 ⁵²		69.52 353
Oct. 6.9	46.125 ²²⁰		65.65 244	12.877 ²⁰³		56.40 207	55.677 ²²⁶		57.37 95	25.68 ⁶⁷		65.99 338
16.9	46.345 ²⁵⁹		63.21 247	13.080 ²⁴¹		54.33 217	55.903 ²⁷⁰		56.42 49	26.35 ⁸⁰		62.61 312
26.9	46.604 ²⁰⁷		60.74 244	13.321 ²⁷⁵		52.16 223	56.173 ³¹⁰		55.93 3	27.15 ⁹³		59.49 278
Nov. 5.8	46.901 ³²⁹		58.30 236	13.596 ³⁰⁶		49.93 224	56.483 ³⁴⁴		55.96 53	28.08 ¹⁰⁴		56.71 238
15.8	47.230 ³⁵⁵		55.94 221	13.902 ³³¹		47.69 218	56.827 ³⁶⁶		56.49 106	29.12 ¹¹⁴		54.33 189
25.8	47.585 ³⁷³		53.73 199	14.233 ³⁴⁹		45.51 205	57.193 ³⁸⁰		57.54 156	30.26 ¹¹⁸		52.44 136
Dec. 5.7	47.958 ³⁸⁰		51.74 170	14.582 ³⁵⁴		43.46 188	57.573 ³⁸³		59.09 201	31.44 ¹²⁰		51.08 76
15.7	48.338 ³⁷⁵		50.04 138	14.936 ³⁴⁸		41.58 163	57.956 ³⁷¹		61.10 239	32.64 ¹¹⁹		50.32 16
25.7	48.713 ³⁵⁸		48.66 99	15.284 ³³⁴		39.95 133	58.327 ³⁴⁸		63.49 273	33.83 ¹¹⁴		50.16 47
35.7	49.071		47.67	15.618		38.62	58.675		66.22	34.97		50.63
Mean Place	43.836		86.34	10.571		74.75	53.904		48.21	26.129		95.30
Sec δ, Tan δ	1.216		+0.691	1.105		+0.470	1.247		-0.745	4.893		+4.790
D _φ α, D _∞ α	+0.07		+0.04	+0.07		+0.03	+0.06		-0.05	+0.10		+0.31
D _φ δ, D _∞ δ	-0.4		+0.3	-0.4		+0.3	-0.4		+0.3	-0.4		+0.3

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Crateris. Mag. 4.2		δ Leonis. Mag. 5.0		β Ursæ Majoris. Mag. 2.4		α Ursæ Majoris. Mag. 2.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 55 s	° ' -17 51 "	h m 10 56 s	° ' + 4 2 "	h m 10 56 s	° ' +56 48 "	h m 10 58 s	° ' +62 10 "
Jan. 0.7	48.317	45.96	21.252	79.20	56.541	56.98	43.36	74.35
10.7	48.619 ³⁰²	48.54 ²⁵⁸	21.551 ²⁹⁹	77.25 ¹⁹⁵	57.017 ⁴⁷⁶	57.03 ⁵	43.90 ⁵⁴	74.58 ²³
20.6	48.887 ²⁶⁸	51.10 ²⁵⁶	21.819 ²⁶⁸	75.48 ¹⁷⁷	57.446 ⁴²⁹	57.62 ⁵⁹	44.39 ⁴⁹	75.36 ⁷⁸
30.6	49.116 ²²⁹	53.63 ²⁵³	22.051 ²³²	73.95 ¹⁵³	57.814 ³⁶⁸	58.73 ¹¹¹	44.82 ⁴³	76.68 ¹²²
Feb. 9.6	49.300 ¹⁸⁴	56.04 ²⁴¹	22.239 ¹⁸⁸	72.67 ¹²⁸	58.112 ²⁹⁸	60.28 ¹⁵⁵	45.15 ³³	78.45 ¹⁷⁷
19.5	49.438 ¹³⁸	58.28 ²²⁴	22.380 ¹⁴¹	71.66 ¹⁰¹	58.329 ²¹⁷	62.21 ¹⁹³	45.39 ²⁴	80.60 ²¹⁵
Mar. 1.5	49.527 ⁸⁹	60.30 ²⁰²	22.474 ⁹⁴	70.93 ⁷³	58.463 ¹³⁴	64.43 ²²²	45.55 ¹⁶	83.01 ²⁴¹
11.5	49.571 ⁴⁴	62.10 ¹⁸⁰	22.523 ⁴⁹	70.44 ⁴⁹	58.514 ⁵¹	66.83 ²⁴⁰	45.60 ⁵	85.61 ²⁸⁰
21.5	49.574 ³	63.63 ¹⁵³	22.531 ⁸	70.21 ²³	58.488 ²⁶	69.29 ²⁴⁶	45.56 ⁴	88.25 ²⁶⁴
31.4	49.541 ³³	64.89 ¹²⁶	22.504 ²⁷	70.19 ²	58.390 ⁹⁸	71.72 ²⁴³	45.44 ¹²	90.83 ²⁵⁸
Apr. 10.4	49.479 ⁶²	65.89 ¹⁰⁰	22.448 ⁵⁶	70.34 ¹⁵	58.232 ¹⁵⁸	74.02 ²³⁰	45.24 ²⁰	93.25 ²⁴²
20.4	49.394 ⁸⁵	66.61 ⁷²	22.368 ⁸⁰	70.64 ³⁰	58.024 ²⁰⁸	76.09 ²⁰⁷	44.99 ²⁵	95.41 ²¹⁶
30.4	49.292 ¹⁰²	67.07 ⁴⁶	22.272 ⁹⁶	71.05 ⁴¹	57.778 ²⁴⁶	77.85 ¹⁷⁶	44.68 ³¹	97.24 ¹⁸³
May 10.3	49.177 ¹¹⁵	67.27 ²⁰	22.166 ¹⁰⁶	71.55 ⁵⁰	57.508 ²⁷⁰	79.27 ¹⁴²	44.36 ³²	98.67 ¹⁴³
20.3	49.057 ¹²⁰	67.23 ⁴	22.054 ¹¹²	72.10 ⁵⁵	57.224 ²⁸⁴	80.27 ¹⁰⁰	44.01 ³⁵	99.65 ⁹⁸
30.3	48.936 ¹²¹	66.94 ²⁹	21.943 ¹¹¹	72.69 ⁵⁹	56.938 ²⁸⁶	80.83 ⁵⁶	43.65 ³⁶	100.17 ⁵²
June 9.2	48.819 ¹¹⁷	66.43 ⁵¹	21.836 ¹⁰⁷	73.30 ⁶¹	56.658 ²⁸⁰	80.94 ¹¹	43.31 ³⁴	100.21 ⁴
19.2	48.706 ¹¹³	65.71 ⁷²	21.735 ¹⁰¹	73.91 ⁶¹	56.395 ²⁶³	80.60 ³⁴	42.98 ³³	99.75 ⁴⁶
29.2	48.602 ¹⁰⁴	64.80 ⁹¹	21.645 ⁹⁰	74.50 ⁵⁹	56.154 ²⁴¹	79.82 ⁷⁸	42.67 ³¹	98.84 ⁹¹
July 9.2	48.511 ⁹¹	63.73 ¹⁰⁷	21.567 ⁷⁸	75.05 ⁵⁵	55.943 ²¹¹	78.63 ¹¹⁹	42.40 ²⁷	97.48 ¹³⁶
19.1	48.435 ⁷⁶	62.53 ¹²⁰	21.505 ⁶²	75.55 ⁵⁰	55.767 ¹⁷⁶	77.03 ¹⁶⁰	42.19 ²¹	95.70 ¹⁷⁸
29.1	48.376 ⁵⁹	61.25 ¹²⁸	21.460 ⁴⁵	75.97 ⁴²	55.629 ¹³⁸	75.08 ¹⁹⁵	42.01 ¹⁸	93.55 ²¹⁵
Aug. 8.1	48.338 ³⁸	59.92 ¹³³	21.435 ²⁵	76.29 ³²	55.534 ⁹⁵	72.82 ²²⁶	41.89 ¹²	91.06 ²⁴⁹
18.1	48.325 ¹³	58.59 ¹³³	21.432 ³	76.48 ¹⁹	55.485 ⁴⁹	70.26 ²⁵⁶	41.80 ⁹	88.31 ²⁷⁵
28.0	48.340 ¹⁵	57.34 ¹²⁵	21.455 ²³	76.52 ⁴	55.487 ²	67.48 ²⁷⁸	41.79 ¹	85.31 ³⁰⁰
Sept. 7.0	48.385 ⁴⁵	56.22 ¹¹²	21.505 ⁵⁰	76.37 ¹⁵	55.541 ⁵⁴	64.52 ²⁹⁶	41.83 ⁴	82.14 ³¹⁷
17.0	48.465 ⁸⁰	55.27 ⁹⁵	21.587 ⁸²	76.03 ³⁴	55.650 ¹⁰⁹	61.41 ³¹¹	41.95 ¹²	78.86 ³²⁸
26.9	48.582 ¹¹⁷	54.58 ⁶⁹	21.702 ¹¹⁵	75.46 ⁵⁷	55.816 ¹⁶⁶	58.24 ³¹⁷	42.13 ¹⁸	75.51 ³³⁵
Oct. 6.9	48.738 ¹⁵⁶	54.18 ⁴⁰	21.853 ¹⁵¹	74.63 ⁸³	56.040 ²²⁴	55.06 ³¹⁸	42.38 ²⁵	72.18 ³³³
16.9	48.933 ¹⁹⁵	54.14 ⁴	22.039 ¹⁸⁶	73.54 ¹⁰⁹	56.324 ²⁸⁴	51.92 ³¹⁴	42.69 ³¹	68.92 ³²⁶
26.9	49.166 ²³³	54.48 ³⁴	22.262 ²²³	72.20 ¹³⁴	56.664 ³⁴⁰	48.91 ³⁰¹	43.08 ²⁹	65.83 ³⁰⁹
Nov. 5.8	49.432 ²⁶⁶	55.21 ⁷³	22.519 ²⁵⁷	70.62 ¹⁵⁸	57.057 ³⁹³	46.09 ²⁸²	43.52 ⁴⁴	62.95 ²⁸⁸
15.8	49.732 ³⁰⁰	56.34 ¹¹³	22.805 ²⁸⁶	68.84 ¹⁷⁸	57.498 ⁴⁴¹	43.54 ²⁵⁵	44.02 ⁵⁰	60.39 ²⁵⁶
25.8	50.053 ³²¹	57.84 ¹⁵⁰	23.115 ³¹⁰	66.89 ¹⁹⁵	57.977 ⁴⁷⁹	41.33 ²²¹	44.56 ⁵⁴	58.20 ²¹⁹
Dec. 5.8	50.388 ³³⁵	59.68 ¹⁸⁴	23.438 ³²³	64.82 ²⁰⁷	58.481 ⁵⁰⁴	39.53 ¹⁸⁰	45.13 ⁵⁷	56.47 ¹⁷³
15.7	50.727 ³³⁹	61.81 ²¹³	23.768 ³³⁰	62.71 ²¹¹	58.999 ⁵¹⁸	38.20 ¹³³	45.72 ⁵⁹	55.24 ¹²³
25.7	51.059 ³³²	64.15 ²³⁴	24.095 ³²⁷	60.61 ²¹⁰	59.513 ⁵¹⁴	37.39 ⁸¹	46.30 ⁵⁸	54.55 ⁶⁹
35.7	51.375 ³¹⁶	66.65 ²⁵⁰	24.406 ³¹¹	58.60 ²⁰¹	60.006 ⁴⁹³	37.12 ²⁷	46.86 ⁵⁶	54.44 ¹¹
Mean Place	46.657	43.41	19.579	88.79	54.234	80.09	40.859	98.30
Sec δ , Tan δ	1.051	-0.322	1.003	+0.071	1.827	+1.529	2.144	+1.896
$D_{\delta} \alpha$, $D_{\alpha} \alpha$	+0.06	-0.02	+0.06	0.00	+0.07	+0.10	+0.07	+0.12
$D_{\delta} \delta$, $D_{\alpha} \delta$	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3

APPARENT PLACES OF STARS, 1918.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	χ Leonis. Mag. 4.7		p^4 Leonis. Mag. 5.7		ψ Ursae Majoris. Mag. 3.2		β Crateris. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 0 s	° ' " + 7 46 "	h m 11 2 s	° ' " + 2 23 "	h m 11 5 s	° ' " +44 55 "	h m 11 7 s	° ' " -22 22 "
Jan. 0.7	48.960	36.13	44.941	54.65	5.553	76.10	38.981	42.09
10.7	49.262 302	34.30 183	45.242 301	52.64 201	5.946 393	75.61 49	39.295 314	44.71 262
20.6	49.535 273	32.68 162	45.513 271	50.79 185	6.304 358	75.63 2	39.579 284	47.39 268
30.6	49.772 237	31.31 137	45.748 235	49.16 163	6.615 311	76.12 49	39.821 242	50.07 268
Feb. 9.6	49.964 192	30.24 107	45.940 192	47.77 139	6.869 254	77.06 94	40.020 199	52.66 259
	145	79	146	111	191	133	151	247
19.5	50.109 99	29.45 51	46.086 99	46.66 85	7.060 128	78.39 164	40.171 103	55.13 228
Mar. 1.5	50.208 53	28.94 25	46.185 55	45.81 58	7.188 63	80.03 188	40.274 57	57.41 205
11.5	50.261 13	28.69 1	46.240 14	45.23 35	7.251 2	81.91 201	40.331 16	59.46 181
21.5	50.274 25	28.68 20	46.254 22	44.88 11	7.253 53	83.92 205	40.347 22	61.27 153
31.4	50.249 54	28.88 34	46.232 51	44.77 7	7.200 99	85.97 201	40.325 51	62.80 126
Apr. 10.4	50.195 79	29.22 47	46.181 75	44.84 23	7.101 136	87.98 188	40.274 78	64.06 99
20.4	50.116 95	29.69 56	46.106 92	45.07 36	6.965 166	89.86 166	40.196 96	65.05 69
30.4	50.021 106	30.25 61	46.014 103	45.43 45	6.799 185	91.52 141	40.100 110	65.74 42
May 10.3	49.915 111	30.86 64	45.911 109	45.88 52	6.614 195	92.93 109	39.990 120	66.16 12
20.3	49.804 113	31.50 63	45.802 110	46.40 58	6.419 199	94.02 74	39.870 122	66.28 14
30.3	49.691 109	32.13 61	45.692 108	46.98 61	6.220 194	94.76 39	39.748 123	66.14 40
June 9.2	49.582 103	32.74 58	45.584 102	47.59 62	6.026 184	95.15 1	39.625 119	65.74 65
19.2	49.479 93	33.32 52	45.482 93	48.21 62	5.842 167	95.16 36	39.506 111	65.09 88
29.2	49.386 81	33.84 45	45.389 81	48.83 60	5.675 149	94.80 73	39.395 102	64.21 107
July 9.2	49.305 65	34.29 36	45.308 66	49.43 55	5.526 125	94.07 108	39.293 88	63.14 126
19.1	49.240 50	34.65 25	45.242 51	49.98 48	5.401 98	92.99 140	39.205 72	61.88 137
29.1	49.190 29	34.90 14	45.191 31	50.46 40	5.303 67	91.59 171	39.133 51	60.51 145
Aug. 8.1	49.161 8	35.04 1	45.160 10	50.86 26	5.236 35	89.88 200	39.082 27	59.06 148
18.1	49.153 18	35.03 19	45.150 16	51.12 14	5.201 2	87.88 222	39.055 1	57.58 145
28.0	49.171 46	34.84 36	45.166 43	51.26 4	5.203 41	85.66 244	39.056 33	56.13 135
Sept. 7.0	49.217 77	34.48 57	45.209 74	51.22 26	5.244 83	83.22 263	39.089 69	54.78 118
17.0	49.294 111	33.91 81	45.283 108	50.96 48	5.327 128	80.59 274	39.158 109	53.60 95
26.9	49.405 146	33.10 103	45.391 144	50.48 74	5.455 175	77.85 284	39.267 147	52.65 66
Oct. 6.9	49.551 183	32.07 128	45.535 181	49.74 100	5.630 222	75.01 287	39.414 190	51.99 30
16.9	49.734 220	30.79 150	45.716 217	48.74 127	5.852 270	72.14 284	39.604 230	51.69 8
26.9	49.954 254	29.29 171	45.933 252	47.47 151	6.122 314	69.30 275	39.834 269	51.77 49
Nov. 5.8	50.208 284	27.58 189	46.185 282	45.96 175	6.436 354	66.55 257	40.103 301	52.26 92
15.8	50.492 309	25.69 202	46.467 307	44.21 193	6.790 387	63.98 236	40.404 325	53.18 134
25.8	50.801 324	23.67 209	46.774 322	42.28 206	7.177 410	61.62 203	40.729 342	54.52 171
Dec. 5.8	51.125 332	21.58 210	47.096 329	40.22 214	7.587 423	59.59 167	41.071 348	56.23 205
15.7	51.457 328	19.48 205	47.425 326	38.08 212	8.010 421	57.92 124	41.419 343	58.28 231
25.7	51.785 313	17.43 192	47.751 312	35.96 206	8.431 406	56.68 76	41.762 327	60.59 250
35.7	52.098	15.51	48.063	33.90	8.837	55.92	42.089	63.09
Mean Place	47.301	46.96	43.307	63.76	3.622	97.30	37.373	41.03
Sec δ , Tan δ	1.009	+0.137	1.001	+0.042	1.412	+0.998	1.081	-0.412
$D_{\phi} \alpha$, $D_{\omega} \alpha$	+0.06	+0.01	+0.06	0.00	+0.07	+0.06	+0.06	-0.03
$D_{\phi} \delta$, $D_{\omega} \delta$	-0.4	+0.3	-0.4	+0.2	-0.4	+0.2	-0.4	+0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Leonis. Mag. 2.6		♍ Leonis. Mag. 3.4		♋ Ursæ Majoris. Mag. 3.7		♌ Crateris. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 9 s	° ' " +20 57 "	h m 11 9 s	° ' " +15 52 "	h m 11 14 s	° ' " +33 31 "	h m 11 15 s	° ' " -14 20 "
Jan. 0.7	46.678	68.24	57.944	27.15	4.960	72.41	15.930	8.28
10.7	47.002 ³²⁴	66.82 ¹⁴²	58.259 ³¹⁵	25.56 ¹⁵⁹	5.312 ³⁵²	71.42 ⁹⁹	16.240 ³¹⁰	10.71 ²⁴³
20.6	47.296 ²⁹⁴	65.74 ¹⁰⁸	58.546 ²⁸⁷	24.25 ¹³¹	5.634 ³²²	70.86 ⁵⁶	16.523 ²⁸³	13.13 ²⁴²
30.6	47.551 ²⁵⁵	65.01 ⁷³	58.796 ²⁵⁰	23.27 ⁹⁸	5.918 ²⁸⁴	70.74 ¹²	16.767 ²⁴⁴	15.49 ²³⁶
Feb. 9.6	47.763 ²¹²	64.64 ³⁷	59.002 ²⁰⁶	22.62 ⁶⁵	6.151 ²³³	71.04 ³⁰	16.969 ²⁰²	17.72 ²²³
	163	3	159	32	181	69	156	203
19.6	47.926	64.61	59.161	22.30	6.332	71.73	17.125	19.75
Mar. 1.5	48.040 ¹¹⁴	64.90 ²⁹	59.272 ¹¹¹	22.27 ³	6.458 ¹²⁶	72.74 ¹⁰¹	17.236 ¹¹¹	21.59 ¹⁸⁴
	65	55	64	25	72	129	67	159
11.5	48.105	65.45	59.336	22.52	6.530	74.03	17.303	23.18
21.5	48.125 ²⁰	66.23 ⁷⁸	59.357 ²¹	23.00 ⁴⁸	6.551 ²¹	75.50 ¹⁴⁷	17.329 ²⁶	24.52 ¹³⁴
31.4	48.105 ²⁰	67.16 ⁹³	59.340 ¹⁷	23.66 ⁶⁶	6.526 ²⁵	77.09 ¹⁵⁹	17.318 ¹¹	25.61 ¹⁰⁹
	53	103	50	77	65	162	40	84
Apr. 10.4	48.052	68.19	59.290	24.43	6.461	78.71	17.278	26.45
20.4	47.971 ⁸¹	69.26 ¹⁰⁷	59.214 ⁷⁶	25.29 ⁸⁶	6.364 ⁹⁷	80.29 ¹⁵⁸	17.211 ⁶⁷	27.03 ⁵⁸
30.4	47.871 ¹⁰⁰	70.31 ¹⁰⁵	59.119 ⁹⁵	26.17 ⁸⁸	6.243 ¹²¹	81.76 ¹⁴⁷	17.127 ⁸⁴	27.39 ³⁶
May 10.3	47.756 ¹¹⁵	71.31 ¹⁰⁰	59.012 ¹⁰⁷	27.03 ⁸⁶	6.105 ¹³⁸	83.07 ¹³¹	17.030 ⁹⁷	27.51 ¹²
20.3	47.634 ¹²²	72.22 ⁹¹	58.897 ¹¹⁵	27.85 ⁸²	5.957 ¹⁴⁸	84.16 ¹⁰⁹	16.923 ¹⁰⁷	27.43 ⁸
	123	76	117	73	151	85	111	30
30.3	47.511	72.98	58.780	28.58	5.806	85.01	16.812	27.13
June 9.3	47.389 ¹²²	73.60 ⁶²	58.665 ¹¹⁵	29.21 ⁶³	5.657 ¹⁴⁹	85.60 ⁵⁹	16.700 ¹¹²	26.66 ⁴⁷
	114	46	110	52	143	29	108	66
19.2	47.275	74.06	58.555	29.73	5.514	85.89	16.592	26.00
29.2	47.169 ¹⁰⁶	74.32 ²⁶	58.455 ¹⁰⁰	30.11 ³⁸	5.382 ¹³²	85.91 ²	16.489 ¹⁰³	25.20 ⁸⁰
July 9.2	47.076 ⁹³	74.40 ⁸	58.366 ⁸⁹	30.34 ²³	5.265 ¹¹⁷	85.61 ³⁰	16.395 ⁹⁴	24.27 ⁹³
	77	11	74	7	101	58	83	103
19.1	46.999	74.29	58.292	30.41	5.164	85.03	16.312	23.24
29.1	46.938 ⁶¹	73.96 ³³	58.235 ⁵⁷	30.32 ⁹	5.085 ⁷⁹	84.18 ⁸⁵	16.245 ⁶⁷	22.13 ¹¹¹
Aug. 8.1	46.897 ⁴¹	73.44 ⁵²	58.196 ³⁹	30.05 ²⁷	5.028 ⁵⁷	83.05 ¹¹³	16.196 ⁴⁹	21.01 ¹¹²
	16	74	15	45	30	139	26	112
18.1	46.881	72.70	58.181	29.60	4.998	81.66	16.170	19.89
28.0	46.891 ¹⁰	71.76 ⁹⁴	58.189 ⁸	28.95 ⁶⁵	4.997 ¹	80.03 ¹⁶³	16.167 ³	18.85 ¹⁰⁴
	37	116	38	85	31	186	28	92
Sept. 7.0	46.928	70.60	58.227	28.10	5.028	78.17	16.195	17.93
17.0	46.999 ⁷¹	69.24 ¹³⁶	58.296 ⁶⁹	27.03 ¹⁰⁷	5.096 ⁶⁸	76.11 ²⁰⁶	16.257 ⁶²	17.19 ⁷⁴
27.0	47.104 ¹⁰⁵	67.67 ¹⁵⁷	58.400 ¹⁰⁴	25.75 ¹²⁸	5.201 ¹⁰⁵	73.88 ²²³	16.353 ⁹⁶	16.67 ⁵²
Oct. 6.9	47.246 ¹⁴²	65.91 ¹⁷⁶	58.539 ¹³⁹	24.27 ¹⁴⁸	5.348 ¹⁴⁷	71.49 ²³⁹	16.490 ¹³⁷	16.44 ²³
16.9	47.428 ¹⁸²	63.98 ¹⁹³	58.717 ¹⁷⁸	22.57 ¹⁷⁰	5.536 ¹⁸⁸	69.00 ²⁴⁹	16.666 ¹⁷⁶	16.53 ⁹
	220	209	216	186	232	255	216	44
26.9	47.648	61.89	58.933	20.71	5.768	66.45	16.882	16.97
Nov. 5.8	47.905 ²⁵⁷	59.71 ²¹⁸	59.185 ²⁵²	18.69 ²⁰²	6.040 ²⁷²	63.89 ²⁵⁶	17.135 ²⁵³	17.77 ⁸⁰
	290	224	283	212	309	251	285	117
15.8	48.195	57.47	59.468	16.57	6.349	61.38	17.420	18.94
25.8	48.512 ³¹⁷	55.23 ²²⁴	59.780 ³¹²	14.40 ²¹⁷	6.688 ³³⁹	58.99 ²³⁹	17.732 ³¹²	20.46 ¹⁵²
Dec. 5.8	48.848 ³³⁶	53.05 ²¹⁸	60.109 ³²⁹	12.24 ²¹⁶	7.050 ³⁶²	56.81 ²¹⁸	18.061 ³²⁹	22.26 ¹⁸⁰
	346	203	338	207	373	194	337	208
15.7	49.194	51.02	60.447	10.17	7.423	54.87	18.398	24.34
25.7	49.540 ³⁴⁶	49.17 ¹⁸⁵	60.785 ³³⁸	8.23 ¹⁹⁴	7.798 ³⁷⁵	53.28 ¹⁵⁹	18.733 ³³⁵	26.59 ²²⁵
35.7	49.873 ³³³	47.59 ¹⁵⁸	61.110 ³²⁵	6.51 ¹⁷²	8.161 ³⁶³	52.05 ¹²³	19.054 ³²¹	28.95 ²³⁶
Mean Place	45.019	83.30	56.310	40.66	3.245	91.12	14.373	4.66
Sec δ, Tan δ	1.071	+0.383	1.039	+0.284	1.200	+0.663	1.032	-0.256
Dψ _a , Dω _a	+0.06	+0.02	+0.06	+0.02	+0.06	+0.04	+0.06	-0.02
Dψ _δ , Dω _δ	-0.4	+0.2	-0.4	+0.2	-0.4	+0.2	-0.4	+0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	σ Leonis. Mag. 4.1			π Centauri. Mag. 4.3			ι Leonis. Mag. 4.0			τ Leonis. Mag. 5.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 11 16	s 11 16	° ' " + 6 28	h m 11 17	s 11 17	° ' " -54 2	h m 11 19	s 11 19	° ' " +10 58	h m 11 23	s 11 23	° ' " + 3 17
Jan. 0.7	56.117		33.82	17.509		21.66	40.577		39.79	44.759		79.30
10.7	56.427	310	31.91 191	17.943	434	24.42 276	40.891	314	38.00 179	45.070	311	77.29 201
20.6	56.710	283	30.21 170	18.330	387	27.52 310	41.180	289	36.47 153	45.356	286	75.45 184
30.6	56.957	247	28.74 147	18.661	331	30.87 335	41.432	252	35.22 125	45.607	251	73.84 161
Feb. 9.6	57.163	206	27.57 117	18.930	269	34.38 351	41.644	212	34.26 96	45.818	211	72.48 136
		161	90		202	358		166	63		167	109
19.6	57.324		26.67 60	19.132		37.96	41.810		33.63	45.985		71.39
Mar. 1.5	57.439	115	26.07 33	19.266	134	41.52 356	41.929	119	33.30 33	46.106	121	70.59 80
		71	9		70	345		75	7		77	54
11.5	57.510	28	25.74 9	19.336	9	44.97 329	42.004	32	33.23 19	46.183	36	70.05 27
21.5	57.538	7	25.65 13	19.345	49	48.26 304	42.036	5	33.42 39	46.219	0	69.78 6
31.4	57.531	40	25.78 30	19.296	95	51.30 277	42.031	39	33.81 54	46.219	32	69.72 13
Apr. 10.4	57.491		26.08 44	19.201		54.07 241	41.992		34.35	46.187		69.85
20.4	57.426	65	26.52 54	19.062	139	56.48 204	41.928	64	35.01 66	46.130	57	70.15 30
30.4	57.343	83	27.06 60	18.887	175	58.52 163	41.844	84	35.74 76	46.052	78	70.57 42
May 10.3	57.247	96	27.66 64	18.684	203	60.15 118	41.747	97	36.50 75	45.961	91	71.08 51
20.3	57.143	104	28.30 66	18.461	223	61.33 72	41.641	106	37.25 71	45.862	99	71.65 57
		108			238			110			105	61
30.3	57.035		28.96 64	18.223		62.05 25	41.531		37.96	45.757		72.26
June 9.3	56.928	107	29.60 61	17.976	247	62.30 22	41.421	110	38.62 66	45.652	105	72.90 64
19.2	56.825	103	30.21 56	17.728	248	62.08 68	41.316	105	39.21 59	45.549	103	73.53 63
29.2	56.728	97	30.77 50	17.484	244	61.40 113	41.217	99	39.70 49	45.452	97	74.15 62
July 9.2	56.641	87	31.27 42	17.253	231	60.27 153	41.128	89	40.09 39	45.363	89	74.73 58
		73			211			76	26		77	52
19.1	56.568		31.69 32	17.042		58.74 189	41.052		40.35	45.286		75.25
29.1	56.506	62	32.01 19	16.856	186	56.85 220	40.989	63	40.48 13	45.223	63	75.69 44
Aug. 8.1	56.464	42	32.20 6	16.705	151	54.65 243	40.946	43	40.47 1	45.175	48	76.04 35
		20			109	52.22 257	40.922	24	19		26	21
18.1	56.444	2	32.16 10	16.596	60	49.65 263	40.922	0	26	45.149	4	76.25 7
28.0	56.446	30	32.16 30	16.536	3			28	56	45.145	23	76.32 10
Sept. 7.0	56.476		31.86 50	16.533		47.02 257	40.950		39.36	45.168		76.22
17.0	56.537	61	31.36 73	16.589	56	44.45 243	41.009	59	38.58 78	45.221	53	75.90 32
27.0	56.631	94	30.63 97	16.711	122	42.02 217	41.101	92	37.58 100	45.309	88	75.37 53
Oct. 6.9	56.762	131	29.66 122	16.901	190	39.85 182	41.230	129	36.35 123	45.434	125	74.58 79
16.9	56.932	170	28.44 145	17.157	256	38.03 137	41.398	168	34.90 145	45.597	163	73.53 106
		207			319			206	167		201	130
26.9	57.139		26.99 168	17.476		36.66 87	41.604		33.23	45.798		72.23
Nov. 5.8	57.382	243	25.31 187	17.853	377	35.79 30	41.846	242	31.38 185	46.035	237	70.67 156
15.8	57.657	275	23.44 201	18.277	424	35.49 29	42.121	275	29.37 201	46.307	272	68.90 177
25.8	57.960	303	21.43 212	18.738	461	35.78 90	42.425	304	27.25 212	46.607	300	66.96 194
Dec. 5.8	58.281	321	19.31 213	19.220	482	36.68 147	42.748	323	25.10 215	46.926	319	64.88 208
		331			488			333	213		329	214
15.7	58.612		17.18 209	19.708		38.15 201	43.081		22.97	47.255		62.74
25.7	58.943	331	15.09 199	20.187	479	40.16 248	43.415	334	20.93 204	47.585	330	60.60 214
35.7	59.262	319	13.10	20.640	453		43.740	325	19.03 190	47.907	322	58.54 206
Mean Place	54.555		44.39	15.726		29.37	39.020		51.85	43.242		88.86
Sec δ, Tan δ	1.006		+0.113	1.703		-1.379	1.019		+0.194	1.002		+0.058
D _φ α, D _α α	+0.06		+0.01	+0.05		-0.09	+0.06		+0.01	+0.06		0 00
D _φ δ, D _α δ	-0.4		+0.2	-0.4		+0.2	-0.4		+0.2	-0.4		+0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Draconis. Mag. 4.1		ξ Hydræ. Mag. 3.7		λ Centauri. Mag. 3.3		ν Leonis. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 26 s	° ' +69 46 "	h m 11 28 s	° ' -31 24 "	h m 11 31 s	° ' -62 33 "	h m 11 32 s	° ' - 0 22 "
Jan. 0.7	35.64	35.94	59.477	12.01	61.23	48.10	46.476	23.55
10.7	36.36 72	36.07 13	59.819 342	14.63 262	61.77 54	50.64 254	46.790 314	25.65 210
20.6	37.02 66	36.82 75	60.131 312	17.41 278	62.26 49	53.60 296	47.080 290	27.62 197
30.6	37.61 59	38.14 132	60.404 273	20.28 287	62.68 42	56.87 327	47.336 256	29.41 179
Feb. 9.6	38.09 48	39.98 184	60.632 228	23.16 288	63.03 35	60.40 353	47.552 216	30.96 155
	37	226	180	283	27	366	174	129
19.6	38.46 26	42.24 260	60.812 130	25.99 270	63.30 19	64.06 371	47.726 129	32.25 103
Mar. 1.5	38.72 13	44.84 280	60.942 83	28.69 252	63.49 10	67.77 368	47.855 86	33.28 76
11.5	38.85 1	47.64 290	61.025 39	31.21 231	63.59 8	71.45 356	47.941 46	34.04 51
21.5	38.86 12	50.54 287	61.064 2	33.52 205	63.62 4	75.01 338	47.987 9	34.55 26
31.5	38.74 22	53.41 273	61.062 37	35.57 179	63.58 10	78.39 312	47.996 23	34.81 7
Apr. 10.4	38.52 31	56.14 247	61.025 66	37.36 148	63.48 16	81.51 281	47.973 49	34.88 13
20.4	38.21 39	58.61 214	60.959 89	38.84 118	63.32 22	84.32 245	47.924 70	34.76 27
30.4	37.82 44	60.75 173	60.870 108	40.02 84	63.10 25	86.77 204	47.854 83	34.49 38
May 10.3	37.38 49	62.48 127	60.762 123	40.86 54	62.85 29	88.81 159	47.771 95	34.11 45
20.3	36.89 50	63.75 77	60.639 130	41.40 19	62.56 31	90.40 111	47.676 100	33.63 56
30.3	36.39 52	64.52 24	60.509 136	41.59 12	62.25 34	91.51 62	47.576 103	33.07 68
June 9.3	35.87 50	64.76 28	60.373 137	41.47 45	61.91 34	92.13 11	47.473 102	32.47 79
19.2	35.37 48	64.48 79	60.236 134	41.02 75	61.57 34	92.24 39	47.371 98	31.83 89
29.2	34.89 44	63.69 130	60.102 128	40.27 103	61.23 32	91.85 88	47.273 92	31.17 99
July 9.2	34.45 39	62.39 175	59.974 116	39.24 127	60.91 31	90.97 135	47.181 82	30.52 109
19.2	34.06 34	60.64 219	59.858 102	37.97 149	60.60 28	89.62 177	47.099 70	29.89 119
29.1	33.72 28	58.45 257	59.756 82	36.48 166	60.32 24	87.85 215	47.029 54	29.31 129
Aug. 8.1	33.44 20	55.88 288	59.674 58	34.82 175	60.08 18	85.70 244	46.975 36	28.81 139
18.1	33.24 12	53.00 318	59.616 28	33.07 180	59.90 12	83.26 267	46.939 13	28.40 149
28.0	33.12 5	49.82 337	59.588 6	31.27 176	59.78 5	80.59 279	46.926 15	28.13 159
Sept. 7.0	33.07 5	46.45 353	59.594 44	29.51 164	59.73 2	77.80 281	46.941 44	28.02 169
17.0	33.12 13	42.92 360	59.638 88	27.87 146	59.75 11	74.99 272	46.985 79	28.11 179
27.0	33.25 23	39.32 361	59.726 134	26.41 118	59.86 20	72.27 251	47.064 116	28.43 189
Oct. 6.9	33.48 33	35.71 353	59.860 180	25.23 86	60.06 28	69.76 221	47.180 155	28.99 199
16.9	33.81 42	32.18 339	60.040 227	24.37 46	60.34 37	67.55 180	47.335 194	29.84 209
26.9	34.23 50	28.79 314	60.267 270	23.91 2	60.71 44	65.75 132	47.529 232	30.96 219
Nov. 5.9	34.73 59	25.65 285	60.537 308	23.89 44	61.15 50	64.43 75	47.761 267	32.34 229
15.8	35.32 65	22.80 243	60.845 338	24.33 91	61.65 56	63.68 15	48.028 297	33.98 239
25.8	35.97 71	20.37 197	61.183 361	25.24 137	62.21 58	63.53 48	48.325 316	35.83 249
Dec. 5.8	36.68 74	18.40 141	61.544 369	26.61 179	62.79 60	64.01 109	48.641 329	37.84 259
15.7	37.42 74	16.99 85	61.913 367	28.40 215	63.39 59	65.10 168	48.970 331	39.96 269
25.7	38.16 74	16.14 23	62.280 354	30.55 244	63.98 56	66.78 221	49.301 322	42.12 279
35.7	38.90	15.91	62.634	32.99	64.54	68.99	49.623	44.26
Mean Place	33.223	61.70	57.951	13.93	59.394	57.80	45.013	15.20
Sec δ , Tan δ	2.893	+2.715	1.172	-0.611	2.171	-1.927	1.000	-0.007
$D\psi\alpha$, $D_{\alpha}\alpha$	+0.07	+0.18	+0.06	-0.04	+0.05	-0.13	+0.06	0.00
$D\psi\delta$, $D_{\alpha}\delta$	-0.4	+0.1	-0.4	+0.1	-0.4	+0.1	-0.4	+0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

1918

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Leonis. (Denebola.) Mag. 2.2			β Virginis. Mag. 3.8			Groombridge 1830. Mag. 6.5			γ Ursae Majoris — Mag. 2.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	11	44	+15 1	11	46	+ 2 13	11	48	+38 17	11	49	+54 8
	s		"	s		"	s		"	s		"
Jan. 0.7	54.123		36.20	26.823		27.61	16.935		65.75	33.093		38.36
10.7	54.450	327	34.45 175	27.144	321	25.55 206	17.324	389	64.48 127	33.568	475	37.73 63
20.7	54.753	303	32.97 148	27.442	298	23.64 191	17.689	365	63.69 79	34.013	445	37.66 7
30.6	55.025	272	31.82 115	27.709	267	21.94 170	18.021	332	63.39 30	34.416	403	38.18 52
Feb. 9.6	55.259	234	31.02 80	27.939	230	20.49 145	18.307	286	63.57 18	34.763	347	39.23 105
		191	47		188	117		234	63		280	152
19.6	55.450		30.55 12	28.127		19.32 89	18.541		64.20 102	35.043		40.75 191
Mar. 1.6	55.594	144	30.43 18	28.272	145	18.43 61	18.721	180	65.22 133	35.254	211	42.66 224
11.5	55.694	100	30.61 43	28.373	101	17.82 35	18.846	125	66.55 158	35.389	135	44.90 243
21.5	55.750	56	31.04 66	28.434	61	17.47 11	18.916	70	68.13 174	35.452	63	47.33 232
31.5	55.766	16	31.70 80	28.457	23	17.36 8	18.935	19	69.87 179	35.445	7	49.85 232
		18			8			27			69	
Apr. 10.4	55.748		32.50 92	28.449		17.44 26	18.908		71.66 177	35.376		52.37 240
20.4	55.702	46	33.42 96	28.412	37	17.70 39	18.843	65	73.43 165	35.251	125	54.77 219
30.4	55.632	70	34.38 97	28.355	57	18.09 49	18.748	95	75.08 150	35.081	170	56.96 193
May 10.4	55.545	87	35.35 94	28.279	76	18.58 57	18.626	122	76.58 127	34.875	206	58.89 156
20.3	55.446	99	36.29 87	28.192	87	19.15 61	18.488	138	77.85 100	34.644	231	60.45 118
		107			95			149			248	
30.3	55.339		37.16 77	28.097		19.76 64	18.339		78.85 68	34.396		61.63 75
June 9.3	55.228	111	37.93 63	27.998	99	20.40 65	18.185	154	79.53 35	34.140	256	62.38 31
19.3	55.116	112	38.56 52	27.898	100	21.05 63	18.031	154	79.88 1	33.883	257	62.69 15
29.2	55.008	108	39.08 36	27.799	99	21.68 60	17.882	149	79.89 34	33.633	250	62.54 59
July 9.2	54.905	103	39.44 18	27.704	95	22.28 54	17.741	141	79.55 68	33.397	236	61.95 103
		94			86			128			216	
19.2	54.811		39.62 2	27.618		22.82 48	17.613		78.87 103	33.181		60.92 145
29.1	54.729	82	39.64 18	27.541	77	23.30 38	17.503	110	77.84 135	32.990	191	59.47 183
Aug. 8.1	54.663	66	39.46 36	27.479	62	23.68 26	17.412	91	76.49 166	32.828	162	57.64 219
18.1	54.615	48	39.10 58	27.434	45	23.94 12	17.346	66	74.83 195	32.702	126	55.45 250
28.1	54.589	26	38.52 80	27.411	23	24.06 5	17.308	38	72.88 221	32.615	87	52.95 277
		0			2			6			42	
Sept. 7.0	54.589		37.72 100	27.413		24.01 26	17.302		70.67 245	32.573		50.18 301
17.0	54.620	31	36.72 126	27.445	32	23.75 48	17.333	31	68.22 267	32.580	7	47.17 317
27.0	54.686	66	35.46 146	27.512	67	23.27 73	17.405	72	65.55 283	32.641	61	44.00 328
Oct. 7.0	54.788	102	34.00 169	27.615	103	22.54 98	17.521	116	62.72 294	32.760	119	40.72 333
16.9	54.930	142	32.31 189	27.758	143	21.56 125	17.683	162	59.78 301	32.938	178	37.39 331
		183			183			210			240	
26.9	55.113		30.42 206	27.941		20.31 150	17.893		56.77 302	33.178		34.08 321
Nov. 5.9	55.336	223	28.36 217	28.164	223	18.81 174	18.149	256	53.75 296	33.476	298	30.87 302
15.8	55.597	261	26.19 226	28.423	259	17.07 192	18.449	300	50.79 282	33.830	354	27.85 278
25.8	55.890	293	23.93 226	28.713	290	15.15 207	18.788	339	47.97 261	34.233	403	25.07 241
Dec. 5.8	56.206	316	21.67 221	29.028	315	13.08 215	19.156	368	45.36 232	34.677	444	22.66 200
		332			328			390			470	
15.8	56.538		19.46 208	29.356		10.93 217	19.546		43.04 195	35.147		20.66 150
25.7	56.876	338	17.38 189	29.689	333	8.76 210	19.945	399	41.09 153	35.630	483	19.16 97
35.7	57.208	332	15.49	30.016	327	6.66	20.341	396	39.56	36.111	481	18.19
Mean Place	52.715		49.80	25.436		36.88	15.477		86.30	31.522		62.45
Sec δ , Tan δ	1.035		+0.268	1.001		+0.039	1.274		+0.790	1.707		+1.384
$D_{\psi a}$, $D_{\omega a}$	+0.06		+0.02	+0.06		0.00	+0.06		+0.05	+0.06		+0.09
$D_{\psi \delta}$, $D_{\omega \delta}$	-0.4		+0.1	-0.4		+0.1	-0.4		+0.1	-0.4		0.0

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	4 H. Draconis. Mag. 5.1		δ Crucis. Mag. 3.1		δ Ursæ Majoris. Mag. 3.4		γ Corvi. Mag. 2.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 8 s	° ' +78 3 "	h m 12 10 s	° ' -58 17 "	h m 12 11 s	° ' +57 28 "	h m 12 11 s	° ' -17 5 "
Jan. 0.7	24.25	51.55	48.693	25.94	23.908	52.58	36.444	14.30
10.7	25.40 ¹¹⁵	51.36 ¹⁹	49.215 ⁵²²	28.07 ²¹³	24.419 ⁵¹¹	51.79 ⁷⁹	36.780 ³³⁶	16.57 ²²⁷
20.7	26.49 ¹⁰⁹	51.85 ⁴⁹	49.703 ⁴⁸⁸	30.63 ²⁵⁶	24.907 ⁴⁸⁸	51.60 ¹⁹	37.096 ³¹⁶	18.90 ²³³
30.6	27.51 ¹⁰²	52.95 ¹¹⁰	50.145 ⁴⁴²	33.55 ²⁹²	25.357 ⁴⁵⁰	52.01 ⁴¹	37.384 ²⁸⁸	21.22 ²³²
Feb. 9.6	28.40 ⁸⁹	54.63 ¹⁶⁸	50.528 ³⁸³	36.73 ³¹⁸	25.752 ³⁹⁵	53.00 ⁹⁹	37.637 ²⁵³	23.45 ²²³
	74	218	319	336	330	150	212	210
19.6	29.14	56.81	50.847	40.09	26.082	54.50	37.849	25.55
Mar. 1.6	29.68 ⁵⁴	59.40 ²⁵⁹	51.099 ²⁵²	43.55 ³⁴⁶	26.340 ²⁵⁸	56.45 ¹⁹⁵	38.019 ¹⁷⁰	27.49 ¹⁹⁴
11.5	30.04 ³⁶	62.28 ²⁸⁸	51.281 ¹⁸²	47.03 ³⁴⁸	26.519 ¹⁷⁹	58.74 ²²⁹	38.147 ¹²⁸	29.21 ¹⁷²
21.5	30.19 ¹⁵	65.34 ³⁰⁶	51.399 ¹¹⁸	50.45 ³⁴²	26.620 ¹⁰¹	61.28 ²⁵⁴	38.236 ⁸⁹	30.72 ¹⁵¹
31.5	30.15 ⁴	68.44 ³¹⁰	51.452 ⁵³	53.74 ³²⁹	26.645 ²⁵	63.95 ²⁶⁷	38.286 ⁵⁰	31.98 ¹²⁶
	24	301	7	308	46	269	16	103
Apr. 10.5	29.91	71.45	51.445	56.82	26.599	66.64	38.302	33.01
20.4	29.50 ⁴¹	74.27 ²⁸²	51.383 ⁶²	59.66 ²⁸⁴	26.489 ¹¹⁰	69.24 ²⁶⁰	38.288 ¹⁴	33.80 ⁷⁹
30.4	28.93 ⁵⁷	76.80 ²⁵³	51.273 ¹¹⁰	62.19 ²⁵³	26.326 ¹⁶³	71.66 ²⁴²	38.251 ³⁷	34.38 ⁵⁸
May 10.4	28.23 ⁷⁰	78.94 ²¹⁴	51.119 ¹⁵⁴	64.38 ²¹⁹	26.118 ²⁰⁸	73.81 ²¹⁵	38.193 ⁵⁸	34.73 ³⁵
20.3	27.43 ⁸⁰	80.64 ¹⁷⁰	50.929 ¹⁹⁰	66.17 ¹⁷⁹	25.874 ²⁴⁴	75.62 ¹⁸¹	38.117 ⁷⁶	34.87 ¹⁴
	87	119	223	138	268	141	88	6
30.3	26.56	81.83	50.706	67.55	25.606	77.03	38.029	34.81
June 9.3	25.64 ⁹²	82.49 ⁶⁶	50.459 ²⁴⁷	68.46 ⁹¹	25.322 ²⁸⁴	78.01 ⁹⁸	37.931 ⁹⁸	34.55 ²⁶
19.3	24.71 ⁹³	82.59 ¹⁰	50.193 ²⁶⁶	68.91 ⁴⁵	25.030 ²⁹²	78.52 ⁵¹	37.826 ¹⁰⁵	34.12 ⁴³
29.2	23.78 ⁹³	82.13 ⁴⁶	49.916 ²⁷⁷	68.89 ²	24.740 ²⁹⁰	78.56 ⁴	37.717 ¹⁰⁹	33.52 ⁶⁰
July 9.2	22.88 ⁹⁰	81.14 ⁹⁹	49.635 ²⁸¹	68.40 ⁴⁹	24.458 ²⁸²	78.12 ⁴⁴	37.608 ¹⁰⁹	32.77 ⁷⁵
	85	151	275	94	265	91	106	81
19.2	22.03	79.63	49.360	67.46	24.193	77.21	37.502	31.90
29.2	21.27 ⁷⁶	77.64 ¹⁹⁹	49.101 ²⁵⁹	66.08 ¹³⁸	23.949 ²⁴⁴	75.85 ¹³⁶	37.402 ¹⁰⁰	30.93 ⁹
Aug. 8.1	20.59 ⁶⁸	75.21 ²⁴³	48.865 ²³⁶	64.30 ¹⁷⁸	23.733 ²¹⁶	74.08 ¹⁷⁷	37.312 ⁹⁰	29.88 ¹⁰⁰
18.1	20.01 ⁵⁸	72.39 ²⁸²	48.664 ²⁰¹	62.20 ²¹⁰	23.554 ¹⁷⁹	71.91 ²¹⁷	37.239 ⁷³	28.82 ¹⁰⁰
28.1	19.55 ⁴⁶	69.24 ³¹⁵	48.508 ¹⁵⁶	59.82 ²³⁸	23.414 ¹⁴⁰	69.39 ²⁵²	37.185 ⁵⁴	27.77 ¹⁰⁰
	32	343	98	254	93	282	27	91
Sept. 7.0	19.23	65.81	48.410	57.28	23.321	66.57	37.158	26.79
17.0	19.04 ¹⁹	62.19 ³⁶²	48.374 ³⁶	54.65 ²⁶³	23.280 ⁴¹	63.50 ³⁰⁷	37.162 ⁴	25.92 ⁶⁶
27.0	19.00 ⁴	58.44 ³⁷⁵	48.411 ³⁷	52.05 ²⁶⁰	23.297 ¹⁷	60.23 ³²⁷	37.202 ⁴⁰	25.24 ⁴⁷
Oct. 7.0	19.13 ¹³	54.63 ³⁸¹	48.524 ¹¹³	49.55 ²⁵⁰	23.375 ⁷⁸	56.82 ³⁴¹	37.282 ⁸⁰	24.77 ¹⁸
16.9	19.42 ²⁹	50.84 ³⁷⁹	48.717 ¹⁹³	47.29 ²²⁶	23.521 ¹⁴⁶	53.34 ³⁴⁸	37.407 ¹²⁵	24.59 ¹³
	44	367	273	193	212	348	169	
26.9	19.86	47.17	48.990	45.36	23.733	49.86	37.576	24.72
Nov. 5.9	20.47 ⁶¹	43.70 ³⁴⁷	49.339 ³⁴⁹	43.85 ¹⁵¹	24.013 ²⁸⁰	46.47 ³³⁹	37.789 ²¹³	25.18 ⁴⁶
15.9	21.22 ⁷⁵	40.53 ³¹⁷	49.753 ⁴¹⁴	42.84 ¹⁰¹	24.356 ³⁴³	43.24 ³²³	38.043 ²⁵⁴	26.01 ⁸³
25.8	22.11 ⁸⁹	37.73 ²⁸⁰	50.225 ⁴⁷²	42.37 ⁴⁷	24.758 ⁴⁰²	40.28 ²⁹⁶	38.332 ²⁸⁹	27.19 ¹¹⁸
Dec. 5.8	23.12 ¹⁰¹	35.38 ²³⁵	50.736 ⁵¹¹	42.49 ¹²	25.208 ⁴⁵⁰	37.67 ²⁶¹	38.649 ³¹⁷	28.69 ¹⁵⁰
	110	180	538	71	488	219	336	178
15.8	24.22	33.58	51.274	43.20	25.696	35.48	38.985	30.47
25.7	25.36 ¹¹⁴	32.37 ¹²¹	51.819 ⁵⁴⁵	44.47 ¹²⁷	26.204 ⁵⁰⁸	33.78 ¹⁷⁰	39.329 ³⁴⁴	32.50 ²⁰³
35.7	26.52 ¹¹⁶	31.80 ⁵⁷	52.353 ⁵³⁴	46.28 ¹⁸¹	26.718 ⁵¹⁴	32.65 ¹¹³	39.670 ³⁴¹	34.68 ²¹⁸
Mean Place	22.495	78.70	47.240	35.39	22.601	77.49	35.186	11.84
Sec δ, Tan δ	4.836	+4.732	1.903	-1.619	1.860	+1.569	1.047	-0.307
Dψ a, Dω a	+0.06	+0.32	+0.06	-0.11	+0.06	+0.10	+0.06	-0.02
Dψ δ, Dω δ	-0.4	0.0	-0.4	0.0	-0.4	0.0	-0.4	-0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	<i>κ</i> Draconis. Mag. 3.9		<i>β</i> Corvi. Mag. 2.8		24 Comae seq. Mag. 5.2		<i>α</i> Muscae. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 29 s	° ' +70 13 "	h m 12 30 s	° ' -22 56 "	h m 12 31 s	° ' +18 49 "	h m 12 32 s	° ' -68 40 "
n. 0.7	60.50	57.74	5.716	36.67	2.140	26.75	18.00	50.51
10.7	61.25 75	57.06 68	6.067 351	38.88 221	2.480 340	24.89 186	18.74 74	52.18 167
20.7	61.98 73	57.04 — 2	6.401 334	41.20 232	2.807 327	23.35 154	19.43 69	54.38 220
30.7	62.65 67	57.65 61	6.709 308	43.58 238	3.109 302	22.18 117	20.07 64	57.02 264
b. 9.6	63.26 61	58.88 123	6.982 273	45.94 236	3.380 271	21.40 78	20.63 56	60.03 301
	52	177	235	230	234	39	48	328
19.6	63.78 41	60.65 225	7.217 194	48.24 216	3.614 191	21.01 — 1	21.11 39	63.31 350
ar. 1.6	64.19 29	62.90 262	7.411 151	50.40 201	3.805 147	21.00 36	21.50 31	66.81 360
11.6	64.48 18	65.52 287	7.562 111	52.41 181	3.952 105	21.36 66	21.81 21	70.41 362
21.5	64.66 5	68.39 299	7.673 72	54.22 160	4.057 64	22.02 91	22.02 11	74.03 358
31.5	64.71 6	71.38 301	7.745 37	55.82 138	4.121 28	22.93 111	22.13 3	77.61 345
pr. 10.5	64.65 17	74.39 291	7.782 7	57.20 113	4.149 5	24.04 123	22.16 5	81.06 327
20.4	64.48 28	77.30 269	7.789 22	58.33 91	4.144 35	25.27 129	22.11 12	84.33 300
30.4	64.20 35	79.99 239	7.767 44	59.24 67	4.109 57	26.56 130	21.99 20	87.33 269
ay 10.4	63.85 42	82.38 200	7.723 66	59.91 44	4.052 77	27.86 125	21.79 27	90.02 233
20.4	63.43 47	84.38 156	7.657 81	60.35 19	3.975 91	29.11 115	21.52 32	92.35 190
30.3	62.96 51	85.94 106	7.576 95	60.54 2	3.884 103	30.26 103	21.20 38	94.25 145
ne 9.3	62.45 53	87.00 55	7.481 106	60.52 26	3.781 111	31.29 87	20.82 41	95.70 97
19.3	61.92 53	87.55 — 1	7.375 114	60.26 45	3.670 116	32.16 68	20.41 43	96.67 44
29.3	61.39 53	87.56 52	7.261 119	59.81 67	3.554 117	32.84 49	19.98 45	97.11 7
ly 9.2	60.86 50	87.04 104	7.142 118	59.14 84	3.437 115	33.33 26	19.53 45	97.04 57
19.2	60.36 48	86.00 153	7.024 115	58.30 99	3.322 112	33.59 — 3	19.08 43	96.47 108
29.2	59.88 44	84.47 200	6.909 106	57.31 112	3.210 101	33.62 20	18.65 41	95.39 156
ig. 8.1	59.44 38	82.47 241	6.803 93	56.19 121	3.109 88	33.42 43	18.24 35	93.83 196
18.1	59.06 31	80.06 279	6.710 74	54.98 124	3.021 69	32.99 69	17.89 30	91.87 232
28.1	58.75 23	77.27 313	6.636 48	53.74 123	2.952 47	32.30 93	17.59 22	89.55 261
pt. 7.1	58.52 16	74.14 338	6.588 16	52.51 115	2.905 18	31.37 119	17.37 13	86.94 278
17.0	58.36 8	70.76 358	6.572 22	51.36 102	2.887 15	30.18 143	17.24 3	84.16 287
27.0	58.28 — 3	67.18 371	6.594 64	50.34 81	2.902 54	28.75 168	17.21 10	81.29 283
st. 7.0	58.31 13	63.47 376	6.658 110	49.53 57	2.956 94	27.07 189	17.31 20	78.46 270
17.0	58.44 24	59.71 373	6.768 157	48.96 26	3.050 139	25.18 211	17.51 32	75.76 242
26.9	58.68 33	55.98 361	6.925 205	48.70 9	3.189 183	23.07 226	17.83 43	73.34 207
iv. 5.9	59.01 44	52.37 339	7.130 249	48.79 45	3.372 227	20.81 239	18.26 53	71.27 162
15.9	59.45 53	48.98 309	7.379 287	49.24 83	3.599 266	18.42 246	18.79 62	69.65 107
25.8	59.98 61	45.89 270	7.666 320	50.07 120	3.865 298	15.96 245	19.41 68	68.58 50
xc. 5.8	60.59 70	43.19 222	7.986 342	51.27 155	4.163 323	13.51 239	20.09 72	68.08 11
15.8	61.29 72	40.97 167	8.328 354	52.82 182	4.486 336	11.12 223	20.81 75	68.19 72
25.8	62.01 74	39.30 106	8.682 353	54.64 208	4.822 343	8.89 201	21.56 74	68.91 131
35.7	62.75	38.24	9.035	56.72	5.165	6.88	22.30	70.22
n Place	59.501	84.39	4.551	36.34	1.042	41.66	16.617	62.05
3, Tan δ	2.957	+2.783	1.086	-0.423	1.057	+0.341	2.751	-2.563
, D _α α	+0.05	+0.18	+0.06	-0.03	+0.06	+0.02	+0.07	-0.17
, D _α δ	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington in Time.	76 Ursæ Majoris. Mag. 5.9		β Crucis. Mag. 1.5		31 Comæ. Mag. 5.1		η Centauri. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 37 s	° ' " +63 9 "	h m 12 42 s	° ' " -59 14 "	h m 12 47 s	° ' " +27 58 "	h m 12 48 s	° ' " -39 43 "
n. 0.8	60.17	21.31 95	56.331	16.94 172	43.286	54.19 180	54.470	54.31 193
10.7	60.76 59	20.36 34	56.887 556	18.66 217	43.643 357	52.39 140	54.876 406	56.24 224
20.7	61.33 57	20.02 30	57.418 531	20.83 257	43.989 346	50.99 95	55.266 390	58.48 247
30.7	61.87 54	20.32 93	57.910 492	23.40 288	44.315 326	50.04 49	55.629 363	60.95 264
b. 9.6	62.35 48	21.25 148	58.352 442	26.28 313	44.610 295	49.55 2	55.958 329	63.59 272
	42		384		258		286	
19.6	62.77 34	22.73 198	58.736 320	29.41 328	44.868 215	49.53 42	56.244 242	66.31 275
ar. 1.6	63.11 26	24.71 237	59.056 253	32.69 335	45.083 170	49.95 81	56.486 196	69.06 270
11.6	63.37 15	27.08 267	59.309 186	36.04 336	45.253 125	50.76 115	56.682 150	71.76 260
21.5	63.52 8	29.75 284	59.495 123	39.40 328	45.378 82	51.91 142	56.832 105	74.36 247
31.5	63.60 2	32.59 291	59.618 60	42.68 316	45.460 40	53.33 162	56.937 64	76.83 229
pr. 10.5	63.58 9	35.50 284	59.678 1	45.84 295	45.500 4	54.95 172	57.001 26	79.12 206
20.5	63.49 17	38.34 270	59.679 52	48.79 270	45.504 30	56.67 176	57.027 9	81.18 183
30.4	63.32 22	41.04 242	59.627 103	51.49 241	45.474 56	58.43 172	57.018 39	83.01 156
ay 10.4	63.10 28	43.46 209	59.524 149	53.90 206	45.418 82	60.15 162	56.979 69	84.57 126
20.4	62.82 32	45.55 170	59.375 187	55.96 167	45.336 99	61.77 147	56.910 93	85.83 96
30.3	62.50 36	47.25 124	59.188 224	57.63 126	45.237 116	63.24 125	56.817 116	86.79 62
ne 9.3	62.14 37	48.49 76	58.964 253	58.89 81	45.121 125	64.49 103	56.701 133	87.41 29
19.3	61.77 37	49.25 26	58.711 273	59.70 35	44.996 133	65.52 75	56.568 148	87.70 4
29.3	61.40 37	49.51 26	58.438 288	60.05 13	44.863 139	66.27 48	56.420 158	87.66 39
ly 9.2	61.03 37	49.25 75	58.150 292	59.92 59	44.724 137	66.75 17	56.262 163	87.27 71
19.2	60.66 33	48.50 124	57.858 287	59.33 104	44.587 133	66.92 14	56.099 162	86.56 101
29.2	60.33 31	47.26 171	57.571 272	58.29 146	44.454 126	66.78 44	55.937 155	85.55 130
ig. 8.2	60.02 28	45.55 213	57.299 244	56.83 182	44.328 112	66.34 76	55.782 141	84.25 153
18.1	59.74 24	43.42 253	57.055 205	55.01 215	44.216 95	65.58 107	55.641 118	82.72 172
28.1	59.50 18	40.89 286	56.850 154	52.86 239	44.121 71	64.51 135	55.523 89	81.00 183
pt. 7.1	59.32 12	38.03 316	56.696 92	50.47 255	44.050 44	63.16 165	55.434 51	79.17 188
17.0	59.20 6	34.87 338	56.604 21	47.92 260	44.006 8	61.51 190	55.383 5	77.29 185
27.0	59.14 1	31.49 357	56.583 57	45.32 255	43.998 31	59.61 216	55.378 47	75.44 174
st. 7.0	59.15 10	27.92 365	56.640 142	42.77 241	44.029 74	57.45 237	55.425 102	73.70 153
17.0	59.25 18	24.27 366	56.782 226	40.36 214	44.103 121	55.08 256	55.527 160	72.17 126
26.9	59.43 25	20.61 361	57.008 306	38.22 179	44.224 170	52.52 268	55.687 217	70.91 92
iv. 5.9	59.68 34	17.00 343	57.314 386	36.43 135	44.394 216	49.84 275	55.904 271	69.99 51
15.9	60.02 41	13.57 318	57.700 450	35.08 86	44.610 259	47.09 277	56.175 320	69.48 6
25.9	60.43 48	10.39 286	58.150 502	34.22 30	44.869 297	44.32 270	56.495 360	69.42 38
xc. 5.8	60.91 52	7.53 241	58.652 540	33.92 26	45.166 326	41.62 253	56.855 387	69.80 87
15.8	61.43 57	5.12 189	59.192 559	34.18 83	45.492 347	39.09 232	57.242 405	70.67 130
25.8	62.00 58	3.23 133	59.751 560	35.01 138	45.839 355	36.77 201	57.647 408	71.97 170
35.7	62.58	1.90	60.311	36.39	46.194	34.76	58.055	73.67
Place	59.283	47.10	55.130	26.87	42.331	71.88	53.375	59.39
, Tan δ	2.214	+1 976	1.956	-1.680	1.132	+0.531	1.300	-0.831
, D _α	+0.05	+0.13	+0.07	-0.11	+0.06	+0.03	+0.07	-0.05
, D _δ	-0.4	-0.2	-0.4	-0.2	-0.4	-0.2	-0.4	-0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Ursæ Majoris. (Alioth.) Mag. 1.7			δ Virginis. Mag. 3.7			α Can. Ven. seq. Mag. 2.9			δ Muscæ. Mag. 3.6		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	12	50	+56 23	12	51	+ 3 50	12	52	+38 44	12	56	-71 6
	s		"	s		"	s		"	s		"
Jan. 0.8	26.350		52.28 128	29.323		24.55 206	12.540		78.81 166	37.46		12.63 128
10.7	26.848 498		51.00 67	29.654 331		22.49 206	12.927 387		77.15 115	38.29 83		13.91 128
20.7	27.337 489		50.33 5	29.975 321		20.57 192	13.305 378		76.00 63	39.09 80		15.74 183
30.7	27.801 464		50.28 —	30.274 299		18.88 169	13.661 356		75.37 9	39.84 75		18.05 231
Feb. 9.6	28.224 423		50.85 57	30.548 274		17.45 143	13.987 326		75.28 —	40.53 69		20.77 272
	369		114	238		113	285		43	59		306
19.6	28.593		51.99	30.786		16.32	14.272		75.71	41.12		23.83
Mar. 1.6	28.900 307		53.65 166	30.987 201		15.50 82	14.511 239		76.62 91	41.63 51		27.12 329
11.6	29.136 236		55.73 208	31.149 162		14.97 53	14.699 188		77.96 134	42.04 41		30.60 348
21.5	29.302 166		58.14 241	31.273 124		14.75 22	14.835 136		79.66 170	42.35 31		34.19 359
31.5	29.393 91		60.80 266	31.360 87		14.78 3	14.922 87		81.61 195	42.56 21		37.76 357
	22		275	53		26	39		214	12		350
Apr. 10.5	29.415		63.55	31.413		15.04	14.961		83.75	42.68		41.26
20.5	29.371 44		66.31 276	31.434 —		15.48 44	14.957 4		85.95 220	42.70 —		44.64 338
30.4	29.269 102		68.98 267	31.429 5		16.07 59	14.914 43		88.14 219	42.62 8		47.82 318
May 10.4	29.118 151		71.43 245	31.400 29		16.77 70	14.836 78		90.24 210	42.46 16		50.71 289
20.4	28.921 197		73.61 218	31.351 49		17.52 75	14.732 104		92.17 193	42.22 24		53.28 257
	229		184	67		79	129		169	32		219
30.3	28.692		75.45 143	31.284		18.31	14.603		93.86	41.90		55.47 176
June 9.3	28.435 257		76.88 99	31.205 79		19.10 79	14.458 145		95.28 142	41.52 38		57.23 131
19.3	28.161 274		77.87 53	31.113 92		19.86 76	14.297 161		96.36 108	41.09 43		58.54 79
29.3	27.876 285		78.40 —	31.013 100		20.57 71	14.130 167		97.10 74	40.62 47		59.33 27
July 9.2	27.588 288		78.44 —	30.907 106		21.23 66	13.957 173		97.46 36	40.12 50		59.60 —
	284		44	109		57	172		0	52		24
19.2	27.304		78.00	30.798		21.80	13.785		97.46	39.60		59.36 76
29.2	27.031 273		77.09 91	30.690 108		22.27 36	13.619 166		97.06 40	39.09 51		58.60 126
Aug. 8.2	26.777 254		75.71 138	30.587 103		22.63 21	13.461 158		96.27 79	38.60 49		57.34 172
18.1	26.547 230		73.91 180	30.492 95		22.84 6	13.318 143		95.12 115	38.15 45		55.62 212
28.1	26.350 197		71.71 220	30.413 79		22.90 —	13.196 122		93.62 150	37.76 39		53.50 246
	158		256	59		12	97		184	31		
Sept. 7.1	26.192		69.15	30.354		22.78	13.099		91.78	37.45		51.04
17.0	26.080 112		66.28 287	30.321 33		22.46 32	13.036 63		89.63 215	37.25 20		48.34 270
27.0	26.022 58		63.14 314	30.318 —		21.93 53	13.010 26		87.21 242	37.14 11		45.48 286
Oct. 7.0	26.024 2		59.79 335	30.353 35		21.15 78	13.028 18		84.53 268	37.16 2		42.58 290
17.0	26.089 65		56.29 350	30.429 76		20.13 102	13.094 66		81.67 286	37.31 15		39.76 283
	135		356	120		127	118		302	30		263
26.9	26.224		52.73	30.549		18.86	13.212		78.65	37.61		37.14
Nov. 5.9	26.428 204		49.18 355	30.713 164		17.35 151	13.381 169		75.55 310	38.03 42		34.79 235
15.9	26.702 274		45.73 345	30.920 207		15.60 175	13.604 223		72.44 311	38.56 53		32.87 192
25.9	27.039 337		42.46 327	31.168 248		13.68 192	13.876 272		69.41 303	39.21 65		31.41 146
Dec. 5.8	27.434 395		39.49 297	31.449 281		11.59 209	14.190 314		66.52 289	39.93 72		30.54 87
	441		261	307		215	348		264	79		30
15.8	27.875		36.88	31.756		9.44	14.538		63.88	40.72		30.24
25.8	28.350 475		34.74 214	32.080 324		7.26 218	14.910 372		61.56 232	41.54 82		30.54 30
35.7	28.843 493		33.12 162	32.409 329		5.15 211	15.293 383		59.64 192	42.38 84		31.44 90
Mean Place	25.584		76.89	28.329		34.19	11.666		99.51	36.333		24.63
Sec δ, Tan δ	1.807		+1.505	1.002		+0.067	1.282		+0.803	3.089		-2.923
Dψ α, Dω α	+0.05		+0.10	+0.06		0.00	+0.06		+0.05	+0.08		-0.19
Dψ δ, Dω δ	-0.4		-0.2	-0.4		-0.2	-0.4		-0.2	-0.4		-0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Time.	ε Virginis. Mag. 3.0		θ Virginis. Mag. 4.4		43 Comae. Mag. 4.3		20 Canum. Venat. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 58 s	° ' +11 23 "	h m 13 5 s	° ' - 5 6 "	h m 13 8 s	° ' +28 17 "	h m 13 13 s	° ' +40 59 "
a. 0.8	6.633	46.37	43.070	11.85	3.718	19.23	52.799	53.70
10.7	6.967 ³³⁴	44.34 ²⁰³	43.404 ³³⁴	13.93 ²⁰⁸	4.072 ³⁵⁴	17.32 ¹⁹¹	53.191 ³⁹²	51.90 ¹⁸⁰
20.7	7.293 ³²⁶	42.54 ¹⁸⁰	43.731 ³²⁷	15.95 ²⁰²	4.420 ³⁴⁸	15.83 ¹⁴⁹	53.580 ³⁸⁹	50.61 ¹²⁹
30.7	7.599 ³⁰⁶	41.03 ¹⁵¹	44.038 ³⁰⁷	17.85 ¹⁹⁰	4.752 ³³²	14.79 ¹⁰⁴	53.953 ³⁷³	49.86 ⁷⁵
b. 9.7	7.879 ²⁸⁰	39.88 ¹¹⁵	44.320 ²⁸²	19.57 ¹⁷²	5.057 ³⁰⁵	14.22 ⁵⁷	54.299 ³⁴⁶	49.67 ¹⁹
	246	80	250	150	271	8	309	36
19.6	8.125	39.08	44.570	21.07	5.328	14.14	54.608	50.03
r. 1.6	8.334 ²⁰⁹	38.63 ⁴⁵	44.784 ²¹⁴	22.33 ¹²⁶	5.560 ²³²	14.51 ³⁷	54.873 ²⁶⁵	50.92 ⁸⁹
11.6	8.504 ¹⁷⁰	38.53 ¹⁰	44.961 ¹⁷⁷	23.33 ¹⁰⁰	5.749 ¹⁸⁹	15.31 ⁸⁰	55.090 ²¹⁷	52.26 ¹³⁴
21.6	8.634 ¹³⁰	38.75 ²²	45.102 ¹⁴¹	24.07 ⁷⁴	5.894 ¹⁴⁵	16.47 ¹¹⁶	55.255 ¹⁶⁵	54.00 ¹⁷⁴
31.5	8.728 ⁹⁴	39.24 ⁴⁹	45.206 ¹⁰⁴	24.57 ⁵⁰	5.996 ¹⁰²	17.93 ¹⁴⁶	55.370 ¹¹⁵	56.03 ²⁰³
	57	72	71	26	60	168	65	224
r. 10.5	8.785	39.96	45.277	24.83	6.056	19.61	55.435	58.27
20.5	8.809 ²⁴	40.85 ⁸⁹	45.317 ⁴⁰	24.89 ⁶	6.079 ²³	21.42 ¹⁸¹	55.454 ¹⁹	60.62 ²³⁵
30.4	8.806 ³	41.86 ¹⁰¹	45.329 ¹²	24.79 ¹⁰	6.068 ¹¹	23.30 ¹⁸⁸	55.431 ²³	62.98 ²³⁶
y 10.4	8.777 ²⁹	42.93 ¹⁰⁷	45.318 ¹¹	24.52 ²⁷	6.027 ⁴¹	25.15 ¹⁸⁵	55.369 ⁶²	65.28 ²³⁰
20.4	8.728 ⁴⁹	44.02 ¹⁰⁹	45.284 ³⁴	24.15 ³⁷	5.959 ⁶⁸	26.93 ¹⁷⁸	55.277 ⁹²	67.40 ²¹²
	68	106	52	47	88	162	122	192
30.4	8.660	45.08	45.232	23.68	5.871	28.55	55.155	69.32
ne 9.3	8.577 ⁸³	46.09 ¹⁰¹	45.162 ⁷⁰	23.14 ⁵⁴	5.763 ¹⁰⁸	29.98 ¹⁴³	55.011 ¹⁴⁴	70.94 ¹⁶²
19.3	8.482 ⁹⁵	47.00 ⁹¹	45.079 ⁸³	22.54 ⁶⁰	5.640 ¹²³	31.18 ¹²⁰	54.849 ¹⁶²	72.23 ¹²⁹
29.3	8.377 ¹⁰⁵	47.79 ⁷⁹	44.985 ⁹⁴	21.91 ⁶³	5.507 ¹³³	32.11 ⁹³	54.674 ¹⁷⁵	73.17 ⁹⁴
ly 9.2	8.266 ¹¹¹	48.44 ⁶⁵	44.881 ¹⁰⁴	21.26 ⁶⁵	5.367 ¹⁴⁰	32.74 ⁶³	54.491 ¹⁸³	73.71 ⁵⁴
	114	50	109	65	145	33	188	14
19.2	8.152	48.94	44.772	20.61	5.222	33.07	54.303	73.85
29.2	8.038 ¹¹⁴	49.27 ³³	44.661 ¹¹¹	19.98 ⁶³	5.077 ¹⁴⁵	33.09 ²	54.116 ¹⁸⁷	73.58 ²⁷
ig. 8.2	7.928 ¹¹⁰	49.40 ¹³	44.552 ¹⁰⁹	19.39 ⁵⁹	4.937 ¹⁴⁰	32.78 ³¹	53.936 ¹⁸⁰	72.91 ⁶⁷
18.1	7.826 ¹⁰²	49.35 ⁵	44.451 ¹⁰¹	18.85 ⁵⁴	4.806 ¹³¹	32.15 ⁶³	53.768 ¹⁶⁸	71.84 ¹⁰⁷
28.1	7.739 ⁸⁷	49.07 ²⁸	44.361 ⁹⁰	18.41 ⁴⁴	4.691 ¹¹⁵	31.21 ⁹⁴	53.616 ¹⁵²	70.39 ¹⁴⁵
	67	48	69	34	94	127	126	181
pt. 7.1	7.672	48.59	44.292	18.07	4.597	29.94	53.490	68.58
17.1	7.629 ⁴³	47.86 ⁷³	44.247 ⁴⁵	17.90 ¹⁷	4.530 ⁶⁷	28.37 ¹⁵⁷	53.393 ⁹⁷	66.43 ²¹⁵
27.0	7.619 ¹⁰	46.89 ⁹⁷	44.234 ¹³	17.91 ¹	4.496 ³⁴	26.53 ¹⁸⁴	53.335 ⁵⁸	63.97 ²⁴⁶
t. 7.0	7.645 ²⁶	45.67 ¹²²	44.258 ²⁴	18.13 ²²	4.501 ⁵	24.42 ²¹¹	53.321 ¹⁴	61.26 ²⁷¹
17.0	7.712 ⁶⁷	44.22 ¹⁴⁵	44.323 ⁶⁵	18.58 ⁴⁵	4.549 ⁴⁸	22.08 ²³⁴	53.356 ³⁵	58.32 ²⁹⁴
	111	170	110	73	96	255	88	312
26.9	7.823	42.52	44.433	19.31	4.645	19.53	53.444	55.20
v. 5.9	7.980 ¹⁵⁷	40.61 ¹⁹¹	44.589 ¹⁵⁶	20.29 ⁹⁸	4.790 ¹⁴⁵	16.84 ²⁶⁹	53.588 ¹⁴⁴	52.00 ³²⁰
15.9	8.181 ²⁰¹	38.52 ²⁹⁹	44.790 ²⁰¹	21.55 ¹²⁶	4.984 ¹⁹⁴	14.06 ²⁷⁸	53.787 ¹⁹⁹	48.77 ³²³
25.9	8.423 ²⁴²	36.29 ²²³	45.032 ²⁴²	23.05 ¹⁵⁰	5.224 ²⁴⁰	11.25 ²⁸¹	54.039 ²⁵²	45.59 ³¹⁸
c. 5.8	8.700 ²⁷⁷	33.98 ²³¹	45.309 ²⁷⁷	24.78 ¹⁷³	5.504 ²⁸⁰	8.49 ²⁷⁶	54.338 ²⁹⁹	42.56 ³⁰³
	305	232	306	189	313	262	339	280
15.8	9.005	31.66	45.615	26.67	5.817	5.87	54.677	39.76
25.8	9.329 ³²⁴	29.39 ²²⁷	45.939 ³²⁴	28.68 ²⁰¹	6.154 ³³⁷	3.47 ²⁴⁰	55.045 ³⁶⁸	37.28 ²⁴⁸
35.8	9.661 ³³²	27.26 ²¹³	46.271 ³³²	30.75 ²⁰⁷	6.505 ³⁵¹	1.37 ²¹⁰	55.430 ³⁸⁵	35.21 ²⁰⁷
Place	5.700	58.57	42.139	5.53	2.921	36.76	52.143	74.61
δ, Tan δ	1.020	+0.202	1.004	-0.089	1.135	+0.538	1.325	+0.869
D _α α	+0.06	+0.01	+0.06	-0.01	+0.06	+0.03	+0.05	+0.06
D _α δ	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Hydræ. Mag. 3.3			ι Centauri. Mag. 2.9			ζ^1 Ursæ Majoris. (Mizar.) Mag. 2.4			α Virginis. (Spica.) Mag. 1.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	13	14	-22 44	13	15	-36 16	13	20	+55 20	13	20	-10 44
	s		"	s		"	s		"	s		"
Jan. 0.8	28.513		21.39	59.756		44.30	38.051		47.98	53.106		5.26
10.7	28.871 ³⁵⁸		23.31 ¹⁹²	60.152 ³⁹⁸		46.01 ¹⁷¹	38.530 ⁴⁷⁹		46.34 ¹⁶⁴	53.445 ³³⁹		7.26 ²⁰⁰
20.7	29.219 ³⁴⁸		25.37 ²⁰⁶	60.539 ³⁸⁷		48.01 ²⁰⁰	39.011 ⁴⁸¹		45.29 ¹⁰⁵	53.778 ³³³		9.28 ²⁰²
30.7	29.550 ³³¹		27.51 ²¹⁴	60.906 ³⁶⁷		50.23 ²²²	39.477 ⁴⁶⁶		44.89 ⁴⁰	54.095 ³¹⁷		11.23 ¹⁹⁵
Feb. 9.7	29.854 ³⁰⁴		29.66 ²¹⁵	61.242 ³³⁶		52.60 ²³⁷	39.912 ⁴³⁵		45.10 ²¹	54.387 ²⁹²		13.08 ¹⁸⁵
	271		209	302		245	391		82	263		167
19.6	30.125		31.75	61.544		55.05	40.303		45.92	54.650		14.75
Mar. 1.6	30.362 ²³⁷		33.75 ²⁰⁰	61.806 ²⁶²		57.52 ²⁴⁷	40.641 ³³⁸		47.30 ¹³⁸	54.880 ²³⁰		16.24 ¹⁴⁹
11.6	30.560 ¹⁹⁸		35.61 ¹⁸⁶	62.027 ²²¹		59.96 ²⁴⁴	40.916 ²⁷⁵		49.17 ¹⁸⁷	55.074 ¹⁹⁴		17.50 ¹²⁶
21.6	30.719 ¹⁵⁹		37.30 ¹⁶⁹	62.205 ¹⁷⁸		62.31 ²³⁵	41.125 ²⁰⁹		51.46 ²²⁹	55.231 ¹⁵⁷		18.54 ¹⁰⁴
31.5	30.842 ¹²³		38.82 ¹⁵²	62.343 ¹³⁸		64.54 ²²³	41.264 ¹³⁹		54.03 ²⁵⁷	55.352 ¹²¹		19.35 ⁸¹
	89		132	98		206	73		275	90		38
Apr. 10.5	30.931		40.14	62.441		66.60	41.337		56.78	55.442		19.93
20.5	30.986 ⁵⁵		41.24 ¹¹⁰	62.502 ⁶¹		68.49 ¹⁸⁹	41.345 ⁸		59.60 ²⁸²	55.499 ⁵⁷		20.32 ³⁹
30.4	31.011 ²⁵		42.16 ⁹²	62.528 ²⁶		70.16 ¹⁶⁷	41.293 ⁵²		62.40 ²⁸⁰	55.528 ²⁹		20.51 ¹⁹
May 10.4	31.009 ²		42.85 ⁶⁹	62.521 ⁷		71.60 ¹⁴⁴	41.187 ¹⁰⁶		65.05 ²⁶⁵	55.532 ⁴		20.55 ⁴
20.4	30.982 ²⁷		43.36 ⁵¹	62.487 ³⁴		72.79 ¹¹⁹	41.034 ¹⁵³		67.48 ²⁴³	55.511 ²¹		20.44 ¹¹
	48		30	63		93	193		213	41		25
30.4	30.934		43.66	62.424		73.72	40.841		69.61	55.470		20.19
June 9.3	30.864 ⁷⁰		43.77 ¹¹	62.337 ⁸⁷		74.36 ⁶⁴	40.615 ²²⁶		71.37 ¹⁷⁶	55.411 ⁵⁹		19.85 ³⁴
19.3	30.778 ⁸⁶		43.68 ⁹	62.228 ¹⁰⁹		74.71 ³⁵	40.362 ²⁵³		72.72 ¹³⁵	55.333 ⁷⁸		19.41 ⁴⁴
29.3	30.676 ¹⁰²		43.39 ²⁹	62.101 ¹²⁷		74.78 ⁷	40.091 ²⁷¹		73.62 ⁹⁰	55.242 ⁹¹		18.89 ⁵²
July 9.3	30.561 ¹¹⁵		42.94 ⁴⁵	61.958 ¹⁴³		74.54 ²⁴	39.809 ²⁸²		74.04 ⁴²	55.139 ¹⁰³		18.90 ⁵⁹
	122		64	152		51	287		6	112		64
19.2	30.439		42.30	61.806		74.03	39.522		73.98	55.027		17.66
29.2	30.312 ¹²⁷		41.52 ⁷⁸	61.649 ¹⁵⁷		73.22 ⁸¹	39.237 ²⁸⁵		73.45 ⁵³	54.910 ¹¹⁷		16.98 ⁶⁸
Aug. 8.2	30.186 ¹²⁶		40.61 ⁹¹	61.492 ¹⁵⁷		72.15 ¹⁰⁷	38.961 ²⁷⁶		72.43 ¹⁰²	54.794 ¹¹⁶		16.29 ⁶⁹
18.1	30.068 ¹¹⁸		39.60 ¹⁰¹	61.344 ¹⁴⁸		70.88 ¹²⁷	38.704 ²⁵⁷		70.97 ¹⁴⁶	54.682 ¹¹²		15.60 ⁶⁹
28.1	29.961 ¹⁰⁷		38.53 ¹⁰⁷	61.211 ¹³³		69.42 ¹⁴⁶	38.471 ²³³		69.07 ¹⁹⁰	54.581 ¹⁰¹		14.96 ⁶⁴
	86		110	107		158	200		230	83		57
Sept. 7.1	29.875		37.43	61.104		67.84	38.271		66.77	54.498		14.39
17.1	29.817 ⁵⁸		36.37 ¹⁰⁶	61.030 ⁷⁴		66.18 ¹⁶⁶	38.112 ¹⁵⁹		64.10 ²⁶⁷	54.439 ⁵⁹		13.92 ⁴⁷
27.0	29.794 ²³		35.40 ⁹⁷	60.995 ³⁵		64.56 ¹⁶²	38.001 ¹¹¹		61.13 ²⁹⁷	54.412 ²⁷		13.60 ³²
Oct. 7.0	29.811 ¹⁷		34.56 ⁸⁴	61.008 ¹³		63.00 ¹⁵⁶	37.947 ⁵⁴		57.90 ³²³	54.422 ¹⁰		13.47 ¹³
17.0	29.874 ⁶³		33.94 ⁶²	61.074 ⁶⁶		61.60 ¹⁴⁰	37.956 ⁹		54.48 ³⁴²	54.474 ⁵²		13.56 ⁹
	112		36	122		116	75		357	98		35
27.0	29.986		33.58	61.196		60.44	38.031		50.91	54.572		13.91
Nov. 5.9	30.147 ¹⁶¹		33.49 ⁹	61.375 ¹⁷⁹		59.59 ⁸⁵	38.178 ¹⁴⁷		47.31 ³⁶⁰	54.717 ¹⁴⁵		14.53 ⁶²
15.9	30.359 ²¹²		33.75 ²⁶	61.610 ²³⁵		59.08 ⁵¹	38.394 ²¹⁶		43.74 ³⁵⁷	54.909 ¹⁹²		15.43 ⁹⁰
25.9	30.616 ²⁵⁷		34.35 ⁶⁰	61.895 ²⁸⁵		58.97 ¹¹	38.680 ²⁸⁶		40.31 ³⁴³	55.143 ²³⁴		16.62 ¹¹⁹
Dec. 5.8	30.911 ²⁰⁵		35.28 ⁹³	62.223 ³²⁸		59.29 ³²	39.027 ³⁴⁷		37.10 ³²¹	55.417 ²⁷⁴		18.06 ¹⁴⁴
	325		126	361		73	400		288	304		166
15.8	31.236		36.54	62.584		60.02	39.427		34.22	55.721		19.72
25.8	31.580 ³⁴⁴		38.09 ¹⁵⁵	62.967 ³⁸³		61.16 ¹¹⁴	39.869 ⁴⁴²		31.76 ²⁴⁶	56.045 ³²⁴		21.55 ¹⁸³
35.8	31.936 ³⁵⁶		39.87 ¹⁷⁸	63.359 ³⁹²		62.65 ¹⁴⁹	40.338 ⁴⁶⁹		29.79 ¹⁹⁷	56.380 ³³⁵		23.50 ¹⁹⁵
Mean Place	27.594		21.25	58.828		48.45	37.671		71.83	52.247		1.04
Sec δ , Tan δ	1.084		-0.419	1.240		-0.734	1.759		+1.447	1.018		-0.190
$D_{\psi} \alpha$, $D_{\omega} \alpha$	+0.06		-0.03	+0.07		-0.05	+0.05		+0.09	+0.06		-0.01
$D_{\psi} \delta$, $D_{\omega} \delta$	-0.4		-0.3	-0.4		-0.3	-0.4		-0.3	-0.4		-0.3

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Washington Mean Time.	Groombridge 2001. Mag. 6.1		70 Virginis. Mag. 5.2		ζ Virginis. Mag. 3.4		17 H. Canum. Venat. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 13 23 s 13 23	° ' " +72 48 " " " " " "	h m 13 24 s 13 24	° ' " +14 12 " " " " " "	h m 13 30 s 13 30	° ' " - 0 10 " " " " " "	h m 13 31 s 13 31	° ' " +37 35 " " " " " "
Jan. 0.8	62.00	35.13	25.913	46.14	31.564	45.02	8.788	48.38
10.8	62.81	33.81	26.248	44.05	31.895	47.07	9.164	46.40
20.7	63.63	33.14	26.579	42.21	32.222	49.03	9.541	44.89
30.7	64.44	33.14	26.896	40.69	32.536	50.81	9.906	43.90
Feb. 9.7	65.20	33.81	27.190	39.54	32.828	52.36	10.248	43.48
19.6	65.89	35.09	27.455	38.78	33.092	53.65	10.558	43.59
Mar. 1.6	66.48	36.95	27.687	38.40	33.325	54.67	10.829	44.23
11.6	66.95	39.28	27.882	38.39	33.522	55.38	11.056	45.34
21.6	67.31	42.00	28.038	38.74	33.683	55.82	11.237	46.87
31.5	67.53	44.98	28.156	39.38	33.810	55.98	11.370	48.73
Apr. 10.5	67.61	48.09	28.239	40.27	33.903	55.92	11.457	50.84
20.5	67.56	51.21	28.289	41.35	33.966	55.64	11.501	53.09
30.5	67.39	54.23	28.308	42.56	34.000	55.21	11.504	55.40
May 10.4	67.11	57.06	28.300	43.83	34.008	54.65	11.470	57.67
20.4	66.73	59.58	28.267	45.12	33.991	53.99	11.403	59.83
30.4	66.25	61.73	28.214	46.38	33.954	53.27	11.308	61.81
June 9.3	65.71	63.44	28.140	47.54	33.897	52.52	11.188	63.53
19.3	65.12	64.65	28.051	48.59	33.822	51.78	11.048	64.98
29.3	64.49	65.36	27.948	49.51	33.733	51.04	10.891	66.07
July 9.3	63.85	65.52	27.835	50.24	33.631	50.34	10.721	66.82
19.2	63.19	65.14	27.714	50.79	33.519	49.71	10.545	67.18
29.2	62.55	64.24	27.589	51.14	33.403	49.14	10.365	67.15
Aug. 8.2	61.93	62.81	27.465	51.26	33.284	48.65	10.188	66.73
18.2	61.35	60.92	27.347	51.17	33.171	48.27	10.018	65.91
28.1	60.82	58.57	27.238	50.83	33.065	48.03	9.863	64.71
Sept. 7.1	60.38	55.82	27.147	50.24	32.975	47.92	9.727	63.15
17.1	60.00	52.72	27.079	49.40	32.909	47.99	9.620	61.25
27.0	59.71	49.33	27.041	48.30	32.871	48.26	9.547	59.02
Oct. 7.0	59.53	45.72	27.038	46.94	32.867	48.75	9.514	56.50
17.0	59.47	41.96	27.076	45.35	32.905	49.47	9.529	53.74
27.0	59.54	38.12	27.159	43.52	32.988	50.44	9.595	50.78
Nov. 5.9	59.72	34.31	27.288	41.46	33.117	51.67	9.714	47.67
15.9	60.03	30.61	27.464	39.23	33.292	53.13	9.890	44.50
25.9	60.46	27.13	27.684	36.87	33.512	54.82	10.117	41.34
Dec. 5.9	61.02	23.96	27.944	34.44	33.770	56.68	10.393	38.28
15.8	61.67	21.19	28.235	32.01	34.059	58.67	10.709	35.40
25.8	62.40	18.92	28.551	29.64	34.372	60.74	11.056	32.81
35.8	63.18	17.21	28.880	27.44	34.696	62.81	11.423	30.57
Mean Place	62.440	61.17	25.161					

424

APPARENT PLACES OF STARS, 1918.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Centauri. Mag. 2.6			m Virginis. Mag. 5.2			τ Boötis. Mag. 4.5			γ Ursæ Majoris. (Alkaid.) Mag. 1.9		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	13	34	−53 2	13	37	− 8 17	13	43	+17 51	13	44	+49 42
	s		"	s		"	s		"	s		"
Jan. 0.8	41.712		51.70	19.107		27.69	22.531		40.13	18.928		57.45
10.8	42.214	502	52.87 117	19.443	336	29.66 197	22.865	334	38.01 212	19.354	426	55.49 196
20.7	42.709	495	54.48 161	19.776	333	31.61 195	23.199	334	36.16 185	19.786	432	54.08 141
30.7	43.185	476	56.47 199	20.096	320	33.49 188	23.523	324	34.67 149	20.212	426	53.27 81
Feb. 9.7	43.629	444	58.77 230	20.394	298	35.24 175	23.827	304	33.59 106	20.615	403	53.07 20
		404	256		273	155		279	67		371	43
19.7	44.033		61.33	20.667		36.79	24.106		32.92	20.986		53.50
Mar. 1.6	44.391	358	64.06 273	20.907	240	38.14 135	24.353	247	32.67 25	21.313	327	54.49 99
11.6	44.700	309	66.90 284	21.113	206	39.25 111	24.564	211	32.84 17	21.590	277	56.02 153
21.6	44.956	256	69.79 289	21.285	172	40.12 87	24.738	174	33.37 53	21.812	222	57.98 196
31.5	45.160	204	72.67 288	21.423	138	40.74 62	24.876	138	34.23 86	21.976	164	60.29 231
		152	281		104	42		100	114		107	258
Apr. 10.5	45.312		75.48	21.527		41.16	24.976		35.37	22.083		62.87
20.5	45.413	101	78.17 269	21.599	72	41.36 20	25.043	67	36.69 132	22.133	50	65.57 270
30.5	45.465	52	80.69 252	21.644	45	41.39 3	25.077	34	38.15 146	22.131	2	68.32 275
May 10.4	45.471	6	83.00 231	21.661	17	41.27 12	25.083	6	39.67 152	22.079	52	71.00 268
20.4	45.432	39	85.05 205	21.655	6	41.01 26	25.061	22	41.20 153	21.985	94	73.53 253
		81	176		30	36		45	148		134	229
30.4	45.351		86.81	21.625		40.65	25.016		42.68	21.851		75.82
June 9.4	45.231	120	88.24 143	21.575	50	40.20 45	24.948	68	44.07 139	21.684	167	77.79 197
19.3	45.076	155	89.31 107	21.505	70	39.69 51	24.863	85	45.30 123	21.488	196	79.40 161
29.3	44.890	186	89.99 68	21.420	85	39.12 57	24.760	103	46.36 106	21.270	218	80.62 122
July 9.3	44.678	212	90.27 28	21.321	99	38.51 61	24.642	118	47.23 87	21.036	234	81.40 78
		230	14		111	63		127	63		245	33
19.2	44.448		90.13	21.210		37.88	24.515		47.86	20.791		81.72
29.2	44.206	242	89.59 54	21.091	119	37.25 63	24.381	134	48.26 40	20.541	250	81.58 14
Aug. 8.2	43.963	243	88.66 93	20.971	120	36.63 62	24.244	137	48.39 13	20.292	249	80.97 61
18.2	43.730	233	87.35 131	20.854	117	36.03 60	24.111	133	48.27 12	20.053	239	79.91 106
28.1	43 516	214	85.72 163	20.744	110	35.50 53	23.985	126	47.88 39	19.830	223	78.41 150
		182	192		95	45		109	67		198	190
Sept. 7.1	43.334		83.80	20.649		35.05	23.876		47.21	19.632		76.51
17.1	43.193	141	81.68 212	20.577	72	34.71 34	23.786	90	46.27 94	19.466	166	74.21 230
27.1	43.106	87	79.44 224	20.534	43	34.54 17	23.726	60	45.05 122	19.340	126	71.57 264
Oct. 7.0	43.082	24	77.15 229	20.526	8	34.54 0	23.701	25	43.56 149	19.261	79	68.62 285
17.0	43.129	47	74.93 222	20.560	34	34.76 22	23.716	15	41.80 176	19.238	23	65.43 319
		121	206		80	46		60	199		37	337
27.0	43.250		72.87	20.640		35.22	23.776		39.81	19.275		62.06
Nov. 5.9	43.448	198	71.04 183	20.767	127	35.95 73	23.884	108	37.60 221	19.376	101	58.56 350
15.9	43.721	273	69.56 148	20.942	175	36.93 98	24.041	157	35.22 238	19.543	167	55.05 351
25.9	44.060	339	68.48 108	21.162	220	38.19 126	24.244	203	32.72 250	19.774	231	51.58 347
Dec. 5.9	44.458	398	67.86 62	21.422	260	39.67 148	24.490	246	30.16 256	20.063	289	48.27 331
		445	13		292	169		280	253		340	305
15.8	44.903		67.73	21.714		41.36	24.770		27.63	20.403		45.22
25.8	45.380	477	68.10 37	22.030	316	43.19 183	25.079	309	25.18 245	20.787	384	42.52 270
35.8	45.875	495	68.97 87	22.359	329	45.12 193	25.404	325	22.91 227	21.200	413	40.25 227
Mean Place	40.910		60.30	18.346		22.79	21.922		53.77	18.709		79.54
Sec δ, Tan δ	1.664		−1.330	1.011		−0.146	1.050		+0.322	1.547		+1.180
Dψ α, Dω α	+0.08		−0.08	+0.06		−0.01	+0.06		+0.02	+0.05		+0.07
Dψ δ, Dω δ	−0.4		−0.4	−0.4		−0.4	−0.4		−0.4	−0.4		−0.4

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington in Time.	89 Virginis. Mag. 5.1		ζ Centauri. Mag. 3.1		7 Boötis. Mag. 2.8		θ Apodis. Var. 5.5-6.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 13 45 s	° ' " -17 43 "	h m 13 50 s	° ' " -46 53 "	h m 13 50 s	° ' " +18 47 "	h m 13 57 s	° ' " -76 23 "
n. 0.8	25.481	35.76	25.664	0.18	47.379	76.11	17.58	54.02
10.8	25.828 ³⁴⁷	37.56 ¹⁸⁰	26.116 ⁴⁵²	1.31 ¹¹³	47.713 ³³⁴	73.94 ²¹⁷	18.71 ¹¹³	54.25 ²³
20.7	26.173 ³⁴⁵	39.45 ¹⁸⁹	26.567 ⁴⁵¹	2.82 ¹⁵¹	48.048 ³³⁵	72.06 ¹⁸⁸	19.85 ¹¹⁴	55.07 ⁸²
30.7	26.506 ³³³	41.37 ¹⁹²	27.003 ⁴³⁶	4.66 ¹⁸⁴	48.375 ³²⁷	70.55 ¹⁵¹	20.96 ¹¹¹	56.45 ¹³⁸
b. 9.7	26.817 ³¹¹	43.26 ¹⁸⁹	27.414 ⁴¹¹	6.78 ²¹²	48.684 ³⁰⁹	69.45 ¹¹⁰	22.02 ¹⁰⁶	58.31 ¹⁸⁶
	287	181	379	232	284	67	98	230
19.7	27.104	45.07	27.793	9.10	48.968	68.78	23.00	60.61
ar. 1.6	27.358 ²⁵⁴	46.74 ¹⁶⁷	28.133 ³⁴⁰	11.57 ²⁴⁷	49.221 ²⁵³	68.54 ²⁴	23.90 ⁹⁰	63.29 ²⁶⁸
11.6	27.579 ²²¹	48.26 ¹⁵²	28.431 ²⁹⁸	14.14 ²⁵⁷	49.440 ²¹⁹	68.72 ¹⁸	24.68 ⁷⁸	66.27 ²⁹⁸
21.6	27.766 ¹⁸⁷	49.61 ¹³⁵	28.684 ²⁵³	16.72 ²⁵⁸	49.623 ¹⁸³	69.29 ⁵⁷	25.35 ⁶⁷	69.49 ³²²
31.6	27.917 ¹⁵¹	50.75 ¹¹⁴	28.891 ²⁰⁷	19.27 ²⁵⁵	49.768 ¹⁴⁵	70.18 ⁸⁹	25.90 ⁵⁵	72.83 ³³⁴
	118	96	163	248	109	118	41	345
pr. 10.5	28.035	51.71	29.054	21.75	49.877	71.36	26.31	76.28
20.5	28.122 ⁸⁷	52.47 ⁷⁶	29.173 ¹¹⁹	24.13 ²³⁸	49.952 ⁷⁵	72.73 ¹³⁷	26.58 ²⁷	79.73 ³⁴⁵
30.5	28.179 ⁵⁷	53.05 ⁵⁸	29.249 ⁷⁶	26.35 ²²²	49.994 ⁴²	74.24 ¹⁵¹	26.73 ¹⁵	83.09 ³³⁶
ay 10.4	28.206 ²⁷	53.47 ⁴²	29.283 ³⁴	28.37 ²⁰²	50.006 ¹²	75.83 ¹⁵⁹	26.74 ¹	86.35 ³²⁶
20.4	28.210 ⁴	53.71 ²⁴	29.278 ⁵	30.18 ¹⁸¹	49.990 ¹⁶	77.42 ¹⁵⁹	26.61 ¹³	89.38 ³⁰³
	23	10	42	154	39	154	25	278
30.4	28.187	53.81	29.236	31.72	49.951	78.96	26.36	92.16
ine 9.4	28.142 ⁴⁵	53.77 ⁴	29.156 ⁸⁰	32.98 ¹²⁶	49.887 ⁶⁴	80.39 ¹⁴³	25.99 ³⁷	94.58 ²⁴²
19.3	28.075 ⁶⁷	53.57 ²⁰	29.043 ¹¹³	33.94 ⁹⁶	49.804 ⁸³	81.68 ¹²⁹	25.51 ⁴⁸	96.63 ²⁰⁵
29.3	27.989 ⁸⁶	53.26 ³¹	28.901 ¹⁴²	34.55 ⁶¹	49.703 ¹⁰¹	82.78 ¹¹⁰	24.93 ⁵⁸	98.23 ¹⁶⁰
dy 9.3	27.887 ¹⁰²	52.83 ⁴³	28.733 ¹⁶⁸	34.81 ²⁶	49.585 ¹¹⁸	83.68 ⁹⁰	24.28 ⁶⁵	99.36 ¹¹³
	116	55	188	10	127	66	71	59
19.3	27.771	52.28	28.545	34.71	49.458	84.34	23.57	99.95
29.2	27.646 ¹²⁵	51.64 ⁶⁴	28.343 ²⁰²	34.26 ⁴⁵	49.322 ¹³⁶	84.75 ⁴¹	22.82 ⁷⁵	100.02 ⁷
ug. 8.2	27.517 ¹²⁹	50.91 ⁷³	28.135 ²⁰⁸	33.46 ⁸⁰	49.182 ¹⁴⁰	84.90 ¹⁵	22.06 ⁷⁶	99.56 ⁴⁶
18.2	27.389 ¹²⁸	50.13 ⁷⁸	27.930 ²⁰⁵	32.33 ¹¹³	49.044 ¹³⁸	84.77 ¹³	21.32 ⁷⁴	98.55 ¹⁰¹
28.1	27.268 ¹²¹	49.31 ⁸²	27.737 ¹⁹³	30.91 ¹⁴²	48.914 ¹³⁰	84.37 ⁴⁰	20.63 ⁶⁹	97.06 ¹⁴⁹
	105	81	168	167	116	69	62	196
pt. 7.1	27.163	48.50	27.569	29.24	48.798	83.68	20.01	95.10
17.1	27.081 ⁸²	47.74 ⁷⁶	27.434 ¹³⁵	27.39 ¹⁸⁵	48.702 ⁹⁶	82.71 ⁹⁷	19.50 ⁵¹	92.77 ²³³
27.1	27.029 ⁵²	47.07 ⁶⁷	27.344 ⁹⁰	25.43 ¹⁹⁶	48.635 ⁶⁷	81.45 ¹²⁶	19.13 ³⁷	90.12 ²⁶⁵
st. 7.0	27.016 ¹³	46.53 ⁵⁴	27.307 ³⁷	23.43 ²⁰⁰	48.602 ³³	79.92 ¹⁵³	18.91 ²²	87.27 ²⁸⁵
17.0	27.043 ²⁷	46.17 ³⁶	27.330 ²³	21.49 ¹⁹⁴	48.609 ⁷	78.12 ¹⁸⁰	18.86 ⁵	84.30 ²⁹⁷
	77	13	91	181	53	205	14	296
27.0	27.120	46.04	27.421	19.68	48.662	76.07	19.00	81.34
rv. 6.0	27.246 ¹²⁶	46.17 ¹³	27.580 ¹⁵⁹	18.11 ¹⁵⁷	48.762 ¹⁰⁰	73.82 ²²⁵	19.32 ³²	78.51 ²⁸³
15.9	27.423 ¹⁷⁷	46.58 ⁴¹	27.806 ²²⁶	16.85 ¹²⁶	48.912 ¹⁵⁰	71.39 ²⁴³	19.82 ⁵⁰	75.93 ²⁵⁸
25.9	27.646 ²²³	47.30 ⁷²	28.096 ²⁹⁰	15.94 ⁹¹	49.109 ¹⁹⁷	68.83 ²⁵⁶	20.50 ⁶⁸	73.71 ²²²
xc. 5.9	27.912 ²⁶⁶	48.29 ⁹⁹	28.441 ³⁴⁵	15.45 ⁴⁹	49.349 ²⁴⁰	66.23 ²⁶⁰	21.32 ⁸²	71.91 ¹⁸⁰
	300	128	390	3	277	258	95	127
15.8	28.212	49.57	28.831	15.42	49.626	63.65	22.27	70.64
25.8	28.536 ³²⁴	51.08 ¹⁵¹	29.255 ⁴²⁴	15.83 ⁴¹	49.932 ³⁰⁶	61.16 ²⁴⁹	23.31 ¹⁰⁴	69.92 ⁷²
35.8	28.875 ³³⁹	52.78 ¹⁷⁰	29.698 ⁴⁴³	16.68 ⁸⁵	50.256 ³²⁴	58.84 ²³²	24.41 ¹¹⁰	69.78 ¹⁴
1 Place	24.741	34.12	24.950	7.22	46.825	89.86	17.447	66.33
2, Tan δ	1.050	-0.320	1.463	-1.068	1.056	+0.341	4.254	-4.135
, D _α α	+0.06	-0.02	+0.07	-0.06	+0.06	+0.02	+0.11	-0.24
, D _α δ	-0.4	-0.4	-0.4	-0.5	-0.4	-0.5	-0.3	-0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	11 Boötis. Mag. 6.1		τ Virginis. Mag. 4.3		β Centauri. Mag. 0.9		π Hydræ. Mag. 3.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 13 57 s	° ' " +27 46 "	h m 13 57 s	° ' " + 1 56 "	h m 13 58 s	° ' " -59 58 "	h m 14 1 s	° ' " -26 17 "
Jan. 0.8	27.881	39.31	28.932	18.95	2.020	31.13	42.522	15.42
10.8	28.224 ³⁴³	37.11 ²²⁰	29.258 ³²⁶	16.90 ²⁰⁵	2.604 ⁵⁸⁴	31.81 ⁶⁸	42.884 ³⁶²	16.94 ¹⁵²
20.7	28.572 ³⁴⁸	35.29 ¹⁸²	29.586 ³²⁸	14.97 ¹⁹³	3.188 ⁵⁸⁴	32.98 ¹¹⁷	43.248 ³⁶⁴	18.65 ¹⁷¹
30.7	28.914 ³⁴²	33.91 ¹³⁸	29.906 ³²⁰	13.24 ¹⁷³	3.758 ⁵⁷⁰	34.59 ¹⁶¹	43.601 ³⁵³	20.49 ¹⁹⁴
Feb. 9.7	29.239 ³²⁵	33.02 ⁸⁹	30.208 ³⁰²	11.74 ¹⁵⁰	4.300 ⁵⁴²	36.59 ²⁰⁰	43.937 ³³⁶	22.39 ¹⁹⁰
	300	40	280	121	501	232	310	191
19.7	29.539	32.62	30.488	10.53	4.801	38.91	44.247	24.30
Mar. 1.6	29.808 ²⁶⁹	32.72 ¹⁰	30.738 ²⁵⁰	9.61 ⁹²	5.256 ⁴⁵⁵	41.51 ²⁰⁰	44.529 ²⁸²	26.18 ¹⁶⁸
11.6	30.042 ²³⁴	33.29 ⁵⁷	30.957 ²¹⁹	9.01 ⁶⁰	5.657 ⁴⁰¹	44.29 ²⁷⁸	44.777 ²⁴⁸	27.98 ¹⁸⁰
21.6	30.237 ¹⁹⁵	34.29 ¹⁰⁰	31.144 ¹⁸⁷	8.71 ³⁰	6.000 ³⁴³	47.20 ²⁹¹	44.989 ²¹²	29.66 ¹⁶⁸
31.6	30.392 ¹⁵⁵	35.64 ¹³⁵	31.296 ¹⁵²	8.69 ²	6.283 ²⁸³	50.17 ²⁹⁷	45.167 ¹⁷⁸	31.21 ¹⁵⁵
	116	165	119	24	222	298	145	140
Apr. 10.5	30.508	37.29	31.415	8.93	6.505	53.15	45.312	32.61
20.5	30.586 ⁷⁸	39.14 ¹⁸⁵	31.505 ⁹⁰	9.37 ⁴⁴	6.667 ¹⁶²	56.07 ²⁹²	45.422 ¹¹⁰	33.84 ¹²³
30.5	30.629 ⁴³	41.11 ¹⁹⁷	31.564 ⁵⁹	9.98 ⁶¹	6.769 ¹⁰²	58.89 ²⁸²	45.500 ⁷⁸	34.91 ¹⁰⁷
May 10.4	30.637 ⁸	43.13 ²⁰²	31.595 ³¹	10.72 ⁷⁴	6.810 ⁴¹	61.52 ²⁶³	45.549 ⁴⁹	35.81 ⁹⁰
20.4	30.615 ²²	45.12 ¹⁹⁹	31.602 ⁷	11.54 ⁸²	6.794 ¹⁶	63.96 ²⁴⁴	45.567 ¹⁸	36.53 ⁷²
	50	189	19	87	72	215	9	55
30.4	30.565	47.01	31.583	12.41	6.722	66.11	45.558	37.08
June 9.4	30.489 ⁷⁶	48.74 ¹⁷³	31.542 ⁴¹	13.29 ⁸⁸	6.597 ¹²⁵	67.97 ¹⁸⁶	45.521 ³⁷	37.44 ³⁶
19.3	30.391 ⁹⁸	50.26 ¹⁵²	31.480 ⁶²	14.15 ⁸⁶	6.423 ¹⁷⁴	69.46 ¹⁴⁹	45.459 ⁶²	37.62 ¹⁸
29.3	30.273 ¹¹⁸	51.52 ¹²⁶	31.400 ⁸⁰	14.97 ⁸²	6.204 ²¹⁹	70.57 ¹¹¹	45.374 ⁸⁵	37.61 ¹
July 9.3	30.139 ¹³⁴	52.51 ⁹⁹	31.304 ⁹⁶	15.74 ⁷⁷	5.948 ²⁵⁶	71.25 ⁶⁸	45.269 ¹⁰⁵	37.41 ²⁰
	147	68	110	67	284	25	123	36
19.3	29.992	53.19	31.194	16.41	5.664	71.50	45.146	37.05
29.2	29.837 ¹⁵⁵	53.54 ³⁵	31.073 ¹²¹	16.99 ⁵⁸	5.358 ³⁰⁶	71.30 ²⁰	45.010 ¹³⁶	36.51 ⁵⁴
Aug. 8.2	29.677 ¹⁶⁰	53.56 ²	30.947 ¹²⁶	17.47 ⁴⁸	5.044 ³¹⁴	70.64 ⁶⁶	44.866 ¹⁴⁴	35.79 ⁷²
18.2	29.519 ¹⁵⁸	53.24 ³²	30.821 ¹²⁶	17.81 ³⁴	4.736 ³⁰⁸	69.55 ¹⁰⁹	44.722 ¹⁴⁴	34.94 ⁸⁵
28.1	29.369 ¹⁵⁰	52.57 ⁶⁷	30.701 ¹²⁰	18.00 ¹⁹	4.444 ²⁹²	68.07 ¹⁴⁸	44.583 ¹³⁹	33.98 ⁹⁶
	137	100	109	3	259	182	125	104
Sept. 7.1	29.232	51.57	30.592	18.03	4.185	66.25	44.458	32.94
17.1	29.118 ¹¹⁴	50.23 ¹³⁴	30.503 ⁸⁹	17.89 ¹⁴	3.972 ²¹³	64.12 ²¹³	44.355 ¹⁰³	31.86 ¹⁰⁸
27.1	29.033 ⁸⁵	48.57 ¹⁶⁶	30.441 ⁶²	17.53 ³⁶	3.820 ¹⁵²	61.79 ²³³	44.284 ⁷¹	30.80 ¹⁰⁶
Oct. 7.0	28.982 ⁵¹	46.62 ¹⁹⁵	30.412 ²⁹	16.95 ⁵⁸	3.741 ⁷⁹	59.34 ²⁴⁵	44.252 ³²	29.81 ⁹⁹
17.0	28.974 ⁸	44.38 ²²⁴	30.423 ¹¹	16.14 ⁸¹	3.745 ⁴	56.85 ²⁴⁹	44.264 ¹²	28.95 ⁸⁶
	39	248	54	106	92	241	64	67
27.0	29.013	41.90	30.477	15.08	3.837	54.44	44.328	28.28
Nov. 6.0	29.102 ⁸⁹	39.22 ²⁶⁸	30.579 ¹⁰²	13.79 ¹²⁹	4.021 ¹⁸⁴	52.22 ²²²	44.445 ¹¹⁷	27.83 ⁴⁵
15.9	29.244 ¹⁴²	36.41 ²⁸¹	30.729 ¹⁵⁰	12.26 ¹⁵³	4.296 ²⁷⁵	50.26 ¹⁹⁶	44.616 ¹⁷¹	27.67 ¹⁶
25.9	29.436 ¹⁹²	33.51 ²⁹⁰	30.925 ¹⁹⁶	10.52 ¹⁷⁴	4.653 ³⁵⁷	48.67 ¹⁵⁹	44.838 ²²²	27.84 ¹⁷
Dec. 5.9	29.674 ²³⁸	30.61 ²⁹⁰	31.162 ²³⁷	8.62 ¹⁹⁰	5.087 ⁴³⁴	47.51 ¹¹⁶	45.106 ²⁶⁸	28.31 ⁴⁷
	278	282	273	202	495	68	307	80
15.8	29.952	27.79	31.435	6.60	5.582	46.83	45.413	29.11
25.8	30.263 ³¹¹	25.15 ²⁶⁴	31.736 ³⁰¹	4.52 ²⁰⁸	6.123 ⁵⁴¹	46.67 ¹⁶	45.749 ³³⁶	30.21 ¹¹⁰
35.8	30.595 ³³²	22.75 ²⁴⁰	32.053 ³¹⁷	2.44 ²⁰⁸	6.693 ⁵⁷⁰	47.02 ³⁵	46.103 ³⁵⁴	31.57 ¹³⁶
Mean Place	27.450	55.50	28.319	27.06	1.440	41.00	41.854	16.61
Sec δ, Tan δ	1.130	+0.527	1.001	+0.034	1.999	-1.731	1.115	-0.494
Dψ α, Dω α	+0.05	+0.03	+0.06	0.00	+0.08	-0.10	+0.07	-0.03
Dψ δ, Dω δ	-0.3	-0.5	-0.3	-0.5	-0.3	-0.5	-0.3	-0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Time.	λ Virginis. Mag. 4.6		♌ Libræ. Mag. 6.3		♍ Boëtis. Mag. 4.1		♎ Boëtis. Mag. 5.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 14 s	° ' " -12 59 "	h m 14 19 s	° ' " -11 20 "	h m 14 22 s	° ' " +52 13 "	h m 14 22 s	° ' " +19 35 "
n. 0.8	40.728	42.32	1.250	27.87	24.106	24.52	38.837	28.75
10.8	41.063 335	44.06 174	1.581 331	29.62 175	24.525 419	22.22 230	39.161 324	26.48 227
20.8	41.401 338	45.84 178	1.917 336	31.41 179	24.963 438	20.45 177	39.492 331	24.52 196
30.7	41.733 332	47.61 177	2.247 330	33.16 175	25.405 442	19.28 117	39.822 330	22.91 161
b. 9.7	42.051 318 295	49.29 168 157	2.562 315 298	34.81 165 152	25.838 433 408	18.75 53 10	40.141 319 298	21.71 120 76
19.7	42.346	50.86	2.860	36.33	26.246	18.85	40.439	20.95
ar. 1.7	42.615 269	52.27 141	3.130 270	37.68 135	26.620 374	19.58 73	40.713 274	20.64 31
11.6	42.856 241	53.48 121	3.372 242	38.81 113	26.949 329	20.89 131	40.956 243	20.78 14
21.6	43.064 208	54.50 102	3.583 211	39.74 93	27.227 278	22.71 182	41.166 210	21.33 55
31.6	43.240 176 145	55.30 80 60	3.763 180 148	40.44 70 50	27.449 222 165	24.96 225 257	41.341 175 142	22.24 91 123
or. 10.5	43.385	55.90	3.911	40.94	27.614	27.53	41.483	23.47
20.5	43.499 114	56.32 42	4.028 117	41.24 30	27.720 106	30.31 278	41.589 106	24.93 146
30.5	43.584 85	56.55 23	4.116 88	41.38 14	27.768 48	33.21 290	41.662 73	26.57 164
ay 10.5	43.640 56	56.64 9	4.175 59	41.37 1	27.761 7	36.10 289	41.705 43	28.30 173
20.4	43.668 28 2	56.60 4 15	4.207 32 6	41.23 14 26	27.703 58 105	38.90 280 261	41.717 12 17	30.07 177 173
30.4	43.670	56.45	4.213	40.97	27.598	41.51	41.700	31.80
ne 9.4	43.646 24	56.18 27	4.192 21	40.64 33	27.449 149	43.85 234	41.658 42	33.43 163
19.4	43.599 47	55.84 34	4.148 44	40.23 41	27.264 185	45.86 201	41.590 68	34.92 149
29.3	43.529 70	55.42 42	4.080 68	39.76 47	27.044 220	47.48 162	41.500 90	36.24 132
ly 9.3	43.439 90 108	54.94 48 53	3.993 87 106	39.25 51 55	26.799 245 267	48.67 119 73	41.390 110 126	37.33 109 86
19.3	43.331	54.41	3.887	38.70	26.532	49.40	41.264	38.19
29.2	43.209 122	53.83 58	3.765 122	38.12 58	26.252 280	49.66 26	41.124 140	38.78 59
ug. 8.2	43.079 130	53.22 61	3.636 129	37.53 59	25.964 288	49.43 23	40.975 149	39.10 32
18.2	42.945 134	52.60 62	3.502 134	36.95 58	25.678 286	48.72 71	40.823 152	39.14 4
28.2	42.814 131 120	51.99 61 57	3.370 132 122	36.39 56 51	25.400 278 258	47.54 118 164	40.674 149 140	38.87 27 57
pt. 7.1	42.694	51.42	3.248	35.88	25.142	45.90	40.534	38.30
17.1	42.592 102	50.91 51	3.143 105	35.44 44	24.910 232	43.84 206	40.412 122	37.44 86
27.1	42.516 76	50.50 41	3.064 79	35.11 33	24.716 194	41.38 246	40.313 99	36.27 117
t. 7.1	42.474 42	50.23 27	3.017 47	34.94 17	24.567 149	38.58 280	40.247 66	34.82 145
17.0	42.472 2 44	50.13 10 10	3.011 6 39	34.94 0 20	24.474 93 33	35.46 312 335	40.220 27 17	33.08 174 201
27.0	42.516	50.23	3.050	35.14	24.441	32.11	40.237	31.07
v. 6.0	42.610 94	50.58 35	3.138 88	35.59 45	24.476 35	28.58 353	40.302 65	28.84 223
15.9	42.754 144	51.19 61	3.276 138	36.28 69	24.581 105	24.96 362	40.418 116	26.43 241
25.9	42.946 192	52.04 85	3.463 187	37.21 93	24.756 175	21.35 361	40.583 165	23.86 257
c. 5.9	43.182 236 275	53.14 110 134	3.694 231 270	38.40 119 139	24.999 243 304	17.84 351 331	40.795 212 254	21.22 264 264
15.9	43.457	54.48	3.964	39.79	25.303	14.53	41.049	18.58
25.8	43.762 305	56.00 152	4.264 300	41.35 156	25.661 358	11.53 300	41.335 286	16.03 255
35.8	44.085 323	57.67 167	4.584 320	43.06 171	26.059 398	8.93 260	41.646 311	13.63 240
Place	40.153	39.37	0.702	24.43	24.373	45.49	38.493	41.84
, Tan δ	1.026	-0.231	1.020	-0.201	1.632	+1.290	1.062	+0.356
D _α	+0.06	-0.01	+0.07	-0.01	+0.04	+0.07	+0.06	+0.02
D _δ	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ϕ Virginis. Mag. 5.0		δ Ursæ Minoris. Mag. 4.4		ρ Boötis. Mag. 3.8		γ Boötis. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 23 s	° ' " - 1 51 "	h m 14 27 s	° ' " +76 2 "	h m 14 28 s	° ' " +30 43 "	h m 14 28 s	° ' " +38 39 "
Jan. 0.8	59.035	45.78	38.08	74.72	17.969	34.89	46.652	41.20
10.8	59.356 ³²¹	47.72 ¹⁹⁴	38.97 ⁸⁹	72.68 ²⁰⁴	18.304 ³³⁵	32.51 ²³⁸	47.007 ³⁵⁵	38.80 ²⁴⁰
20.8	59.682 ³²⁰	49.58 ¹⁸⁶	39.90 ⁹³	71.26 ¹⁴²	18.651 ³⁴⁷	30.53 ¹⁹⁸	47.375 ³⁶⁸	36.86 ¹⁹⁴
30.7	60.004 ³²²	51.31 ¹⁷³	40.86 ⁹⁶	70.49 ⁷⁷	18.999 ³⁴⁸	29.01 ¹⁵²	47.746 ³⁷¹	35.44 ¹⁴²
Feb. 9.7	60.314 ³¹⁰	52.85 ¹⁵⁴	41.82 ⁹⁶	70.41 ⁸	19.338 ³³⁹	27.99 ¹⁰²	48.108 ³⁶²	34.57 ⁸⁷
	292	129	92	59	320	49	341	29
19.7	60.606	54.14	42.74	71.00	19.658	27.50	48.449	34.28
Mar. 1.7	60.872 ²⁶⁶	55.17 ¹⁰³	43.59 ⁸⁵	72.23 ¹²³	19.950 ²⁹²	27.54 ⁴	48.763 ³¹⁴	34.57 ²⁹
11.6	61.112 ²¹⁰	55.91 ⁷⁴	44.34 ⁷⁵	74.04 ¹⁸¹	20.211 ²⁶¹	28.11 ⁵⁷	49.043 ²⁸⁰	35.41 ⁸⁴
21.6	61.320 ²⁰⁸	56.37 ⁴⁶	44.97 ⁶³	76.35 ²³¹	20.437 ²²⁶	29.13 ¹⁰²	49.284 ²⁴¹	36.74 ¹³³
31.6	61.497 ¹⁷⁷	56.56 ¹⁹	45.44 ⁴⁷	79.07 ²⁷²	20.626 ¹⁸⁹	30.55 ¹⁴²	49.482 ¹⁹⁸	38.50 ¹⁷⁶
	148	5	33	301	149	177	155	210
Apr. 10.6	61.645	56.51	45.77	82.08	20.775	32.32	49.637	40.60
20.5	61.760 ¹¹⁵	56.24 ²⁷	45.94 ¹⁷	85.25 ³¹⁷	20.886 ¹¹¹	34.32 ²⁰⁰	49.749 ¹¹²	42.94 ²³⁴
30.5	61.848 ⁸⁸	55.79 ⁴⁵	45.94 ⁰	88.48 ³²³	20.959 ⁷³	36.51 ²¹⁹	49.818 ⁶⁹	45.43 ²⁴⁹
May 10.5	61.906 ⁵⁸	55.21 ⁵⁸	45.80 ¹⁴	91.64 ³¹⁶	20.995 ³⁶	38.75 ²²⁴	49.845 ²⁷	47.99 ²⁵⁶
20.4	61.937 ³¹	54.52 ⁶⁹	45.51 ²⁹	94.62 ²⁹⁸	20.999 ⁴	41.00 ²²⁵	49.834 ¹¹	50.50 ²⁵¹
	5	75	43	272	30	215	46	240
30.4	61.942	53.77	45.08	97.34	20.969	43.15	49.788	52.90
June 9.4	61.922 ²⁰	52.99 ⁷⁸	44.54 ⁵⁴	99.73 ²³⁹	20.909 ⁶⁰	45.16 ²⁰¹	49.706 ⁸²	55.10 ²²⁰
19.4	61.878 ⁴⁴	52.21 ⁷⁸	43.89 ⁶⁵	101.70 ¹⁹⁷	20.823 ⁸⁶	46.97 ¹⁸¹	49.595 ¹¹¹	57.06 ¹⁹⁶
29.3	61.811 ⁶⁷	51.43 ⁷⁸	43.15 ⁷⁴	103.20 ¹⁵⁰	20.710 ¹¹³	48.51 ¹⁵⁴	49.456 ¹³⁹	58.69 ¹⁶³
July 9.3	61.724 ⁸⁷	50.70 ⁷³	42.34 ⁸¹	104.20 ¹⁰⁰	20.576 ¹³⁴	49.75 ¹²⁴	49.293 ¹⁶³	59.98 ¹²⁹
	104	69	85	47	152	93	181	92
19.3	61.620	50.01	41.49	104.67	20.424	50.68	49.112	60.90
29.3	61.500 ¹²⁰	49.40 ⁶¹	40.62 ⁸⁷	104.61 ⁶	20.256 ¹⁶⁸	51.25 ⁵⁷	48.916 ¹⁹⁶	61.41 ⁵¹
Aug. 8.2	61.371 ¹²⁹	48.86 ⁵⁴	39.74 ⁸⁸	104.01 ⁶⁰	20.080 ¹⁷⁶	51.45 ²⁰	48.711 ²⁰⁵	61.50 ⁹
18.2	61.236 ¹³⁵	48.42 ⁴⁴	38.87 ⁸⁷	102.89 ¹¹²	19.901 ¹⁷⁹	51.29 ¹⁶	48.504 ²⁰⁷	61.18 ³²
28.2	61.104 ¹³²	48.09 ³³	38.05 ⁸²	101.26 ¹⁶³	19.724 ¹⁷⁷	50.75 ⁵⁴	48.300 ²⁰⁴	60.43 ⁷⁵
	124	18	78	209	165	90	192	116
Sept. 7.1	60.980	47.91	37.27	99.17	19.559	49.85	48.108	59.27
17.1	60.872 ¹⁰⁸	47.86 ⁵	36.57 ⁷⁰	96.64 ²⁵³	19.410 ¹⁴⁹	48.53 ¹²⁷	47.937 ¹⁷¹	57.72 ¹⁵⁵
27.1	60.789 ⁸³	47.99 ¹³	35.96 ⁶¹	93.73 ²⁹¹	19.288 ¹²²	46.96 ¹⁶²	47.793 ¹⁴⁴	55.79 ¹⁹³
Oct. 7.1	60.735 ⁵⁴	48.33 ³⁴	35.46 ⁵⁰	90.50 ³²³	19.200 ⁸⁸	45.01 ¹⁹⁵	47.686 ¹⁰⁷	53.51 ²²⁸
17.0	60.721 ¹⁴	48.87 ⁵⁴	35.09 ³⁷	87.00 ³⁵⁰	19.151 ⁴⁹	42.75 ²²⁶	47.623 ⁶³	50.91 ²⁶⁰
	30	78	23	368	1	253	12	283
27.0	60.751	49.65	34.86	83.32	19.152	40.22	47.611	48.06
Nov. 6.0	60.828 ⁷⁷	50.66 ¹⁰¹	34.78 ⁸	79.53 ³⁷⁹	19.203 ⁵¹	37.47 ²⁷⁵	47.654 ⁴³	44.98 ³⁰⁸
16.0	60.954 ¹²⁶	51.90 ¹²⁴	34.87 ⁹	75.72 ³⁸¹	19.307 ¹⁰⁴	34.56 ²⁰¹	47.754 ¹⁰⁰	41.77 ³²¹
25.9	61.128 ¹⁷⁴	53.36 ¹⁴⁶	35.12 ²⁵	71.99 ³⁷³	19.465 ¹⁵⁸	31.54 ³⁰³	47.912 ¹⁵⁸	38.49 ³²⁸
Dec. 5.9	61.346 ²¹⁸	55.02 ¹⁶⁸	35.53 ⁴¹	68.45 ³⁵⁴	19.674 ²⁰⁹	28.51 ³⁰³	48.125 ²¹³	35.22 ³²⁷
	258	181	57	326	255	298	264	315
15.9	61.604	56.83	36.10	65.19	19.929	25.53	48.389	32.07
25.8	61.891 ²⁸⁷	58.73 ¹⁹⁰	36.79 ⁶⁹	62.33 ²⁸⁶	20.222 ²⁹³	22.72 ²⁸¹	48.694 ³⁰⁵	29.14 ²⁹³
35.8	62.201 ³¹⁰	60.67 ¹⁹⁴	37.60 ⁸¹	59.95 ²³⁸	20.542 ³²⁰	20.16 ²⁵⁶	49.032 ³³⁸	26.52 ²⁶²
Mean Place	58.548	39.37	40.819	98.13	17.794	50.85	46.617	59.08
Sec δ , Tan δ	1.001	-0.032	4.150	+4.028	1.163	+0.594	1.281	+0.800
$D\psi a$, $D_{\omega} a$	+0.06	0.00	0.00	+0.22	+0.05	+0.03	+0.05	+0.04
$D\psi \delta$, $D_{\omega} \delta$	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	η Centauri. Mag. 2.6		σ Boötis. Mag. 4.5		α^2 Centauri. Mag. 0.3		β Boötis. Mag. 5.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 30 s	° ' -41 47 "	h m 14 31 s	° ' +30 5 "	h m 14 34 s	° ' -60 29 "	h m 14 35 s	° ' +44 44 "
a. 0.8	18.115	48.35	6.812	47.20	2.11	36.37	47.039	69.04
10.8	18.530 ⁴¹⁵	49.17 ⁸²	7.146 ³³⁴	44.82 ²³⁸	2.68 ⁵⁷	36.63 ²⁶	47.410 ³⁷¹	66.60 ²⁴⁴
20.8	18.952 ⁴²²	50.32 ¹¹⁵	7.492 ³⁴⁶	42.83 ¹⁹⁹	3.27 ⁵⁹	37.36 ⁷³	47.799 ³⁸⁹	64.64 ¹⁹⁶
30.7	19.370 ⁴¹⁸	51.76 ¹⁴⁴	7.839 ³⁴⁷	41.28 ¹⁵⁵	3.85 ⁵⁸	38.54 ¹¹⁸	48.193 ³⁹⁴	63.24 ¹⁴⁰
b. 9.7	19.773 ⁴⁰³	53.44 ¹⁶⁸	8.177 ³³⁸	40.23 ¹⁰⁵	4.41 ⁵⁶	40.13 ¹⁵⁹	48.581 ³⁸⁸	62.42 ⁸²
	381	186	320	53	53	193	371	20
19.7	20.154	55.30	8.497	39.70	4.94	42.06	48.952	62.22
ur. 1.7	20.506 ³⁵²	57.30 ²⁰⁰	8.791 ²⁹⁴	39.71 ¹	5.43 ⁴⁹	44.29 ²²³	49.293 ³⁴¹	62.63 ⁴¹
11.6	20.825 ³¹⁹	59.37 ²⁰⁷	9.054 ²⁶³	40.22 ⁵¹	5.87 ⁴⁴	46.73 ²⁴⁴	49.598 ³⁰⁵	63.62 ⁹⁹
21.6	21.103 ²⁸³	61.48 ²¹¹	9.282 ²²⁸	41.21 ⁹⁹	6.26 ³⁹	49.36 ²⁶³	49.862 ²⁶⁴	65.12 ¹⁵⁰
31.6	21.352 ²⁴⁴	63.58 ²¹⁰	9.473 ¹⁹¹	42.60 ¹³⁹	6.59 ³³	52.09 ²⁷³	50.080 ²¹⁸	67.06 ¹⁹⁴
	206	206	153	173	28	278	171	229
ur. 10.6	21.558	65.64	9.626	44.33	6.87	54.87	50.251	69.35
20.5	21.726 ¹⁶⁸	67.62 ¹⁹⁸	9.740 ¹¹⁴	46.30 ¹⁹⁷	7.08 ²¹	57.65 ²⁷⁸	50.372 ¹²¹	71.91 ²⁵⁶
30.5	21.854 ¹²⁸	69.50 ¹⁸⁸	9.817 ⁷⁷	48.46 ²¹⁶	7.21 ¹³	60.37 ²⁷²	50.446 ⁷⁴	74.62 ²⁷¹
ly 10.5	21.944 ⁹⁰	71.24 ¹⁷⁴	9.859 ⁴²	50.70 ²²⁴	7.30 ⁹	62.96 ²⁵⁹	50.474 ²⁸	77.38 ²⁷⁶
20.4	21.995 ⁵¹	72.81 ¹⁵⁷	9.866 ⁷	52.93 ²²³	7.33 ³	65.41 ²⁴⁵	50.457 ¹⁷	80.10 ²⁷²
	13	140	26	215	4	223	59	257
30.4	22.008	74.21	9.840	55.08	7.29	67.64	50.398	82.67
ne 9.4	21.984 ²⁴	75.38 ¹¹⁷	9.785 ⁵⁵	57.09 ²⁰¹	7.20 ⁹	69.60 ¹⁹⁶	50.302 ⁹⁶	85.05 ²³⁸
19.4	21.924 ⁶⁰	76.33 ⁹⁵	9.701 ⁸⁴	58.90 ¹⁸¹	7.05 ¹⁵	71.26 ¹⁶⁶	50.171 ¹³¹	87.13 ²⁰⁸
29.3	21.830 ⁹⁴	77.01 ⁶⁸	9.592 ¹⁰⁹	60.46 ¹⁵⁶	6.85 ²⁰	72.58 ¹³²	50.009 ¹⁶²	88.87 ¹⁷⁴
ly 9.3	21.704 ¹²⁶	77.42 ⁴¹	9.461 ¹³¹	61.72 ¹²⁶	6.60 ²⁵	73.52 ⁹⁴	49.820 ¹⁸⁹	90.24 ¹³⁷
	152	12	149	95	29	52	211	96
19.3	21.552	77.54	9.312	62.67	6.31	74.04	49.609	91.20
29.3	21.378 ¹⁷⁴	77.35 ¹⁹	9.148 ¹⁶⁴	63.27 ⁶⁰	6.00 ³¹	74.13 ⁹	49.382 ²²⁷	91.71 ⁵¹
lg. 8.2	21.190 ¹⁸⁸	76.88 ⁴⁷	8.974 ¹⁷⁴	63.51 ²⁴	5.65 ³⁵	73.78 ³⁵	49.145 ²³⁷	91.78 ⁷
18.2	20.995 ¹⁹⁵	76.10 ⁷⁸	8.796 ¹⁷⁸	63.38 ¹³	5.31 ³⁴	72.99 ⁷⁹	48.904 ²⁴¹	91.39 ³⁹
28.2	20.802 ¹⁹³	75.07 ¹⁰³	8.621 ¹⁷⁵	62.89 ⁴⁹	4.98 ³³	71.79 ¹²⁰	48.668 ²³⁶	90.55 ⁸⁴
	180	127	165	87	80	157	225	128
pt. 7.1	20.622	73.80	8.456	62.02	4.68	70.22	48.443	89.27
17.1	20.466 ¹⁵⁶	72.34 ¹⁴⁶	8.307 ¹⁴⁹	60.78 ¹²⁴	4.42 ²⁶	68.32 ¹⁹⁰	48.240 ²⁰³	87.57 ¹⁷⁰
27.1	20.345 ¹²¹	70.75 ¹⁵⁹	8.184 ¹²³	59.20 ¹⁵⁸	4.20 ²³	66.14 ²¹⁸	48.065 ¹⁷⁵	85.47 ²¹⁰
t. 7.1	20.267 ⁷⁸	69.08 ¹⁶⁷	8.095 ⁸⁹	57.30 ¹⁹⁰	4.06 ¹⁴	63.79 ²³⁵	47.932 ¹³³	83.00 ²⁴⁷
17.0	20.242 ²⁵	67.43 ¹⁶⁵	8.045 ⁵⁰	55.08 ²²²	3.99 ⁷	61.35 ²⁴⁴	47.844 ⁸⁸	80.22 ²⁷⁸
	35	158	3	249	3	244	34	306
27.0	20.277	65.85	8.042	52.59	4.02	58.91	47.810	77.16
v. 6.0	20.376 ⁹⁹	64.44 ¹⁴¹	8.092 ⁵⁰	49.88 ²⁷¹	4.15 ¹³	56.57 ²³⁴	47.834 ²⁴	73.89 ³²⁷
16.0	20.539 ¹⁶³	63.26 ¹¹⁸	8.194 ¹⁰²	46.99 ²⁸⁹	4.36 ²¹	54.45 ²¹²	47.923 ⁸⁹	70.49 ³⁴⁰
25.9	20.766 ²²⁷	62.36 ⁹⁰	8.349 ¹⁵⁵	44.00 ²⁹⁹	4.67 ³¹	52.61 ¹⁸⁴	48.073 ¹⁵⁰	67.03 ³⁴⁶
c. 5.9	21.051 ²⁸⁵	61.82 ⁵⁴	8.555 ²⁰⁶	40.98 ³⁰²	5.05 ³⁸	51.15 ¹⁴⁶	48.283 ²¹⁰	63.61 ³⁴²
	333	18	252	296	46	102	267	328
15.9	21.384	61.64	8.807	38.02	5.51	50.13	48.550	60.33
25.8	21.755 ³⁷¹	61.84 ²⁰	9.096 ²⁸⁹	35.22 ²⁸⁰	6.02 ⁵¹	49.57 ⁵⁶	48.864 ³¹⁴	57.30 ³⁰³
35.8	22.156 ⁴⁰¹	62.43 ⁵⁹	9.415 ³¹⁹	32.66 ²⁵⁶	6.58 ⁵⁶	49.51 ⁶	49.216 ³⁵²	54.60 ²⁷⁰
Place	17.622	53.84	6.649	62.88	1.109	51.67	47.203	87.90
l, Tan δ	1.341	-0.894	1.156	+0.580	2.031	-1.767	1.408	+0.991
D _a α	+0.08	-0.05	+0.05	+0.03	+0.09	-0.09	+0.04	+0.05
D _a δ	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ^2 Libræ. Mag. 5.6		Piazzi 221. Mag. 5.8		β Lupi. Mag. 2.8		δ Libræ. Var. 4.8–6.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 52 s	° ' –11 4	h m 14 52 s	° ' +14 46	h m 14 53 s	° ' –42 48	h m 14 56 s	° ' – 8 11
Jan. 0.8	19.314	49.29	21.141	26.46	9.458	11.20	35.647	43.46
10.8	19.634 ³²⁰	50.90 ¹⁶¹	21.449 ³⁰⁸	24.20 ²²⁶	9.868 ⁴¹⁰	11.73 ⁵³	35.961 ³¹⁴	45.14 ¹⁶⁸
20.8	19.963 ³²⁹	52.54 ¹⁶⁴	21.768 ³¹⁹	22.18 ²⁰²	10.292 ⁴²⁴	12.60 ⁸⁷	36.286 ³²⁵	46.81 ¹⁶⁷
30.8	20.294 ³³¹	54.15 ¹⁶¹	22.092 ³²⁴	20.46 ¹⁷²	10.717 ⁴²⁵	13.78 ¹¹⁸	36.613 ³²⁷	48.41 ¹⁶⁰
Feb. 9.7	20.617 ³²³ 308	55.67 ¹⁵² 130	22.409 ³¹⁷ 303	19.08 ¹³⁸ 96	11.134 ⁴¹⁷ 398	15.19 ¹⁴¹ 163	36.934 ³²¹ 305	49.92 ¹⁵¹ 134
19.7	20.925	57.06	22.712	18.12	11.532	16.82	37.239	51.26
Mar. 1.7	21.213 ²⁸⁸	58.27 ¹²¹	22.995 ²⁸³	17.58 ⁵⁴	11.906 ³⁷⁴	18.59 ¹⁷⁷	37.526 ²⁸⁷	52.39 ¹¹³
11.7	21.476 ²⁶³	59.29 ¹⁰²	23.253 ²⁵⁸	17.46 ¹²	12.250 ³⁴⁴	20.47 ¹⁸⁸	37.789 ²⁶³	53.30 ⁹¹
21.6	21.713 ²³⁷	60.08 ⁷⁹	23.484 ²³¹	17.75 ²⁹	12.561 ³¹¹	22.42 ¹⁹⁵	38.027 ²³⁸	53.96 ⁶⁶
31.6	21.921 ²⁰⁸ 180	60.67 ⁵⁹ 39	23.683 ¹⁹⁹ 168	18.41 ⁶⁶ 97	12.837 ²⁷⁶ 237	24.39 ¹⁹⁷ 196	38.236 ²⁰⁹ 181	54.40 ⁴⁴ 21
Apr. 10.6	22.101	61.06	23.851	19.38	13.074	26.35	38.417	54.61
20.5	22.251 ¹⁵⁰	61.25 ¹⁹	23.989 ¹³⁸	20.63 ¹²⁵	13.274 ²⁰⁰	28.27 ¹⁹²	38.568 ¹⁵¹	54.64 ³
30.5	22.371 ¹²⁰	61.29 ⁴	24.095 ¹⁰⁶	22.06 ¹⁴³	13.435 ¹⁶¹	30.12 ¹⁸⁵	38.691 ¹²³	54.49 ¹⁵
May 10.5	22.464 ⁹³	61.19 ¹⁰	24.170 ⁷⁵	23.63 ¹⁵⁷	13.556 ¹²¹	31.86 ¹⁷⁴	38.786 ⁹⁵	54.20 ²⁹
20.5	22.527 ⁶³ 35	60.96 ²³ 31	24.216 ⁴⁶ 15	25.27 ¹⁶⁴ 163	13.638 ⁸² 41	33.48 ¹⁶² 147	38.851 ⁶⁵ 38	53.80 ⁴⁰ 48
30.4	22.562 ⁷	60.65	24.231	26.90	13.679 ²	34.95	38.889 ⁸	53.32
June 9.4	22.569 [—]	60.27 ³⁸	24.217 ¹⁴	28.50 ¹⁶⁰	13.681 [—]	36.23 ¹²⁸	38.897 [—]	52.78 ⁵⁴
19.4	22.547 ²²	59.83 ⁴⁴	24.176 ⁴¹	29.99 ¹⁴⁹	13.642 ³⁹	37.30 ¹⁰⁷	38.877 ²⁰	52.21 ⁵⁷
29.4	22.499 ⁴⁸	59.35 ⁴⁸	24.109 ⁶⁷	31.35 ¹³⁶	13.565 ⁷⁷	38.15 ⁸⁵	38.831 ⁴⁶	51.62 ⁵⁹
July 9.3	22.425 ⁷⁴ 96	58.84 ⁵¹ 52	24.018 ⁹¹ 113	32.53 ¹¹⁸ 98	13.453 ¹¹² 144	38.73 ⁵⁸ 30	38.759 ⁷² 95	51.02 ⁶⁰ 59
19.3	22.329	58.32	23.905	33.51	13.309	39.03	38.664	50.43
29.3	22.212 ¹¹⁷	57.78 ⁵⁴	23.775 ¹³⁰	34.27 ⁷⁶	13.137 ¹⁷²	39.05 [—]	38.549 ¹¹⁵	49.86 ⁵⁷
Aug. 8.2	22.081 ¹³¹	57.24 ⁵⁴	23.631 ¹⁴⁴	34.80 ⁵³	12.946 ¹⁹¹	38.77 ²⁸	38.419 ¹³⁰	49.31 ⁵⁵
18.2	21.940 ¹⁴¹	56.71 ⁵³	23.478 ¹⁵³	35.07 ²⁷	12.744 ²⁰²	38.19 ⁵⁸	38.278 ¹⁴¹	48.81 ⁵⁰
28.2	21.796 ¹⁴⁴ 139	56.21 ⁵⁰ 46	23.322 ¹⁵⁶ 150	35.07 ⁰ 26	12.538 ²⁰⁶ 197	37.34 ⁸⁵ 112	38.134 ¹⁴⁴ 141	48.36 ⁴⁵ 38
Sept. 7.2	21.657 ¹²⁶	55.75 ³⁹	23.172 ¹³⁸	34.81 ⁵⁴	12.341 ¹⁷⁷	36.22 ¹³³	37.993 ¹²⁹	47.98 ²⁸
17.1	21.531 ¹⁰⁶	55.36 ²⁸	23.034 ¹¹⁶	34.27 ⁸³	12.164 ¹⁴⁷	34.89 ¹⁵⁰	37.864 ¹⁰⁷	47.70 ¹⁷
27.1	21.425 ⁷⁵	55.08 ¹⁷	22.918 ⁸⁹	33.44 ¹¹²	12.017 ¹⁰⁶	33.39 ¹⁶¹	37.757 ⁷⁹	47.53 ²
Oct. 7.1	21.350 ³⁷	54.91 ¹	22.829 ⁵²	32.32 ¹³⁸	11.911 ⁵³	31.78 ¹⁶⁵	37.678 ⁴²	47.51 ¹⁵
17.1	21.313 ⁶	54.90 ¹⁸	22.777 ⁹	30.94 ¹⁶⁶	11.858 ⁵	30.13 ¹⁶¹	37.636 ¹	47.66 ³⁴
27.0	21.319	55.08	22.768	29.28	11.863	28.52	37.637	48.00
Nov. 6.0	21.373 ⁵⁴	55.46 ³⁸	22.805 ³⁷	27.38 ¹⁹⁰	11.933 ⁷⁰	27.01 ¹⁵¹	37.685 ⁴⁸	48.55 ⁵⁵
16.0	21.478 ¹⁰⁵	56.07 ⁶¹	22.893 ⁸⁸	25.25 ²¹³	12.070 ¹³⁷	25.69 ¹³²	37.783 ⁹⁸	49.33 ⁷⁵
25.9	21.633 ¹⁵⁵	56.90 ⁸³	23.031 ¹³⁸	22.96 ²²⁹	12.271 ²⁰¹	24.63 ¹⁰⁶	37.932 ¹⁴⁹	50.32 ⁹⁹
Dec. 5.9	21.836 ²⁰³ 245	57.96 ¹⁰⁶ 127	23.216 ¹⁸⁵ 228	20.54 ²⁴² 247	12.534 ²⁶³ 316	23.87 ⁷⁶ 43	38.128 ¹⁹⁶ 237	51.54 ¹²² 140
15.9	22.081	59.23	23.444	18.07	12.850	23.44	38.365	52.94
25.9	22.359 ²⁷⁸	60.66 ¹⁴³	23.709 ²⁶⁵	15.62 ²⁴⁵	13.210 ³⁶⁰	23.38 ⁶	38.638 ²⁷³	54.47 ¹⁵³
35.8	22.665 ³⁰⁶	62.21 ¹⁵⁵	24.001 ²⁹²	13.27 ²³⁵	13.603 ³⁹³	23.68 ³⁰	38.938 ³⁰⁰	56.12 ¹⁶⁵
Mean Place	18.931	46.17	20.923	37.18	9.093	16.71	35.295	39.53
Sec δ , Tan δ	1.019	–0.196	1.034	+0.264	1.363	–0.926	1.010	–0.144
$D_{\psi} a$, $D_{\omega} a$	+0.07	–0.01	+0.06	+0.01	+0.08	–0.04	+0.06	–0.01
$D_{\psi} \delta$, $D_{\omega} \delta$	–0.3	–0.7	–0.3	–0.7	–0.3	–0.7	–0.3	–0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Time.	β Boötis. Mag. 3.6		γ Scorpii. Mag. 3.4		ψ Boötis. Mag. 4.7		ϵ Boötis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 58 s	° ' +40 42 "	h m 14 59 s	° ' -24 57 "	h m 15 0 s	° ' +27 15 "	h m 15 3 s	° ' +25 10 "
i. 0.8	51.195	31.35	16.394	36.57	55.918	46.43	41.987	62.94
10.8	51.537 ³⁴²	28.75 ²⁶⁰	16.736 ³⁴²	37.69 ¹¹²	56.230 ³¹²	43.95 ²⁴⁸	42.297 ³¹⁰	60.48 ²⁴⁶
20.8	51.900 ³⁶³	26.59 ²¹⁶	17.090 ³⁵⁴	38.97 ¹²⁸	56.559 ³²⁹	41.80 ²¹⁵	42.623 ³²⁶	58.33 ²¹⁵
30.8	52.272 ³⁷²	24.93 ¹⁶⁶	17.445 ³⁵⁵	40.36 ¹³⁹	56.895 ³³⁶	40.06 ¹⁷⁴	42.956 ³³³	56.57 ¹⁷⁶
b. 9.7	52.643 ³⁷¹	23.84 ¹⁰⁹	17.792 ³⁴⁷	41.83 ¹⁴⁷	57.228 ³³³	38.79 ¹²⁷	43.286 ³³⁰	55.26 ¹³¹
	357	48	334	148	321	76	319	82
19.7	53.000	23.36	18.126	43.31	57.549	38.03	43.605	54.44
r. 1.7	53.338 ³³⁸	23.47 ¹¹	18.439 ³¹³	44.77 ¹⁴⁶	57.850 ³⁰¹	37.79 ²⁴	43.904 ²⁹⁹	54.12 ³²
11.7	53.645 ³⁰⁷	24.16 ⁶⁹	18.729 ²⁹⁰	46.17 ¹⁴⁰	58.127 ²⁷⁷	38.05 ²⁶	44.180 ²⁷⁶	54.30 ¹⁸
21.6	53.918 ²⁷³	25.39 ¹²³	18.990 ²⁶¹	47.48 ¹³¹	58.373 ²⁴⁶	38.81 ⁷⁶	44.427 ²⁴⁷	54.96 ⁶⁶
31.6	54.152 ²³⁴	27.09 ¹⁷⁰	19.223 ²³³	48.66 ¹¹⁸	58.587 ²¹⁴	40.00 ¹¹⁹	44.642 ²¹⁵	56.05 ¹⁰⁹
	191	209	203	109	180	155	183	145
r. 10.6	54.343 ¹⁴⁸	29.18	19.426	49.75	58.767	41.55	44.825	57.50
20.5	54.491 ¹⁰⁵	31.57 ²³⁹	19.598 ¹⁷²	50.71 ⁹⁶	58.913 ¹⁴⁶	43.40 ¹⁸⁵	44.972 ¹⁴⁷	59.25 ¹⁷⁵
30.5	54.596 ⁶¹	34.17 ²⁶⁰	19.740 ¹⁴²	51.54 ⁸³	59.022 ¹⁰⁹	45.46 ²⁰⁶	45.086 ¹¹⁴	61.21 ¹⁹⁶
y 10.5	54.657 ²⁰	36.86 ²⁶⁹	19.850 ¹¹⁰	52.24 ⁷⁰	59.096 ⁷⁴	47.64 ²¹⁸	45.165 ⁷⁹	63.31 ²¹⁰
20.5	54.677 ²²	39.56 ²⁷⁰	19.928 ⁷⁸	52.84 ⁶⁰	59.138 ⁴²	49.87 ²²³	45.212 ⁴⁷	65.45 ²¹⁴
		261	48	47	6	220	13	212
30.4	54.655	42.17	19.976	53.31	59.144	52.07	45.225	67.57
ne 9.4	54.596 ⁵⁹	44.63 ²⁴⁶	19.990 ¹⁴	53.66 ³⁵	59.118 ²⁶	54.16 ²⁰⁹	45.206 ¹⁹	69.61 ²⁰⁴
19.4	54.501 ⁹⁵	46.85 ²²²	19.973 ¹⁷	53.88 ²²	59.062 ⁵⁶	56.10 ¹⁹⁴	45.157 ⁴⁹	71.50 ¹⁸⁹
29.4	54.372 ¹²⁹	48.78 ¹⁹³	19.926 ⁴⁷	53.99 ¹¹	58.977 ⁸⁵	57.81 ¹⁷¹	45.078 ⁷⁹	73.18 ¹⁶⁸
ly 9.3	54.213 ¹⁵⁹	50.37 ¹⁵⁹	19.849 ⁷⁷	53.96 ³	58.865 ¹¹²	59.27 ¹⁴⁶	44.974 ¹⁰⁴	74.63 ¹⁴⁵
	183	120	103	16	135	117	129	116
19.3	54.030	51.57	19.746	53.80	58.730	60.44	44.845	75.79
29.3	53.825 ²⁰⁵	52.37 ⁸⁰	19.620 ¹²⁶	53.49 ³¹	58.575 ¹⁵⁵	61.28 ⁸⁴	44.697 ¹⁴⁸	76.66 ⁸⁷
lg. 8.2	53.606 ²¹⁹	52.74 ³⁷	19.476 ¹⁴⁴	53.06 ⁴³	58.404 ¹⁷¹	61.79 ⁵¹	44.532 ¹⁶⁵	77.19 ⁵³
18.2	53.378 ²²⁸	52.67 ⁷	19.321 ¹⁵⁵	52.50 ⁵⁶	58.225 ¹⁷⁹	61.95 ¹⁶	44.359 ¹⁷³	77.38 ¹⁹
28.2	53.150 ²²⁸	52.17 ⁵⁰	19.161 ¹⁶⁰	51.82 ⁶⁸	58.043 ¹⁸²	61.74 ²¹	44.182 ¹⁷⁷	77.23 ¹⁵
	222	94	155	76	178	57	174	49
pt. 7.2	52.928	51.23	19.006	51.06	57.865	61.17	44.008	76.74
17.1	52.722 ²⁰⁶	49.87 ¹³⁶	18.864 ¹⁴²	50.24 ⁸²	57.702 ¹⁶³	60.24 ⁹³	43.847 ¹⁶¹	75.89 ⁸⁵
27.1	52.540 ¹⁸²	48.09 ¹⁷⁸	18.745 ¹¹⁹	49.40 ⁸⁴	57.556 ¹⁴⁶	58.96 ¹²⁸	43.705 ¹⁴²	74.69 ¹²⁰
t. 7.1	52.393 ¹⁴⁷	45.93 ²¹⁶	18.659 ⁸⁶	48.58 ⁸²	57.441 ¹¹⁵	57.33 ¹⁶³	43.593 ¹¹²	73.15 ¹⁵⁴
17.1	52.287 ¹⁰⁶	43.43 ²⁵⁰	18.614 ⁴⁵	47.82 ⁷⁶	57.364 ⁷⁷	55.39 ¹⁹⁴	43.517 ⁷⁶	71.31 ¹⁸⁴
	56	280	2	64	33	225	32	214
27.0	52.231	40.63	18.616	47.18	57.331	53.14	43.485	69.17
v. 6.0	52.232 ¹	37.56 ³⁰⁷	18.670 ⁵⁴	46.70 ⁴⁸	57.347 ¹⁶	50.63 ²⁵¹	43.501 ¹⁶	66.77 ²⁴⁰
16.0	52.290 ⁵⁸	34.32 ³²⁴	18.779 ¹⁰⁹	46.44 ²⁶	57.415 ⁶⁸	47.92 ²⁷¹	43.569 ⁶⁸	64.15 ²⁶²
25.9	52.409 ¹¹⁹	30.98 ³³⁴	18.943 ¹⁶⁴	46.40 ⁴	57.537 ¹²²	45.06 ²⁸⁶	43.689 ¹²⁰	61.38 ²⁷⁷
c. 5.9	52.587 ¹⁷⁸	27.62 ³³⁶	19.158 ²¹⁵	46.63 ²³	57.711 ¹⁷⁴	42.13 ²⁹³	43.860 ¹⁷¹	58.53 ²⁸⁵
	233	329	259	49	221	293	219	286
15.9	52.820	24.33	19.417	47.12	57.932	39.20	44.079	55.67
25.9	53.101 ²⁸¹	21.24 ³⁰⁹	19.715 ²⁹⁸	47.87 ⁷⁵	58.194 ²⁶²	36.37 ²⁸³	44.338 ²⁵⁹	52.88 ²⁷⁹
35.8	53.421 ³²⁰	18.42 ²⁸²	20.040 ³²⁵	48.84 ⁹⁷	58.489 ²⁹⁵	33.74 ²⁶³	44.630 ²⁹²	50.28 ²⁶⁰
Place	51.442	48.16	16.017	37.46	55.905	60.10	41.961	75.97
, Tan δ	1.319	+0.860	1.103	-0.466	1.125	+0.515	1.105	+0.470
D. α	+0.05	+0.04	+0.07	-0.02	+0.05	+0.02	+0.05	+0.02
D. δ	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Lupi. Mag. 3.5		ι Libræ. Mag. 4.7		3 Serpentis. Mag. 5.4		γ Triang. Aust. Mag. 3.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 6 s	° ' -51 47 "	h m 15 7 s	° ' -19 28 "	h m 15 11 s	° ' + 5 14 "	h m 15 11 s	° ' -68 22 "
Jan. 0.9	23.320	9.24	32.942	56.94	6.893	27.47	13.62	30.87
10.8	23.785 465	9.29 5	33.268 326	58.19 125	7.192 299	25.43 204	14.33 71	30.26 61
20.8	24.269 484	9.74 45	33.606 338	59.55 136	7.504 312	23.53 190	15.08 75	30.15 11
30.8	24.759 490	10.56 82	33.948 342	60.97 142	7.822 318	21.83 170	15.86 78	30.54 39
Feb. 9.7	25.244 485	11.73 117	34.286 338	62.40 143	8.136 314	20.38 145	16.62 76	31.38 54
	469	145	324	139	303	114	75	129
19.7	25.713	13.18	34.610	63.79	8.439	19.24	17.37	32.67
Mar. 1.7	26.157 444	14.89 171	34.915 305	65.09 130	8.726 287	18.44 80	18.08 71	34.34 167
11.7	26.569 412	16.79 190	35.199 284	66.28 119	8.991 265	17.98 46	18.75 67	36.35 201
21.6	26.947 378	18.85 206	35.457 258	67.34 106	9.232 241	17.88 10	19.37 62	38.64 223
31.6	27.284 337	21.01 216	35.688 231	68.26 92	9.446 214	18.10 22	19.92 55	41.17 253
	205	222	202	76	186	50	47	269
Apr. 10.6	27.579	23.23	35.890	69.02	9.632	18.60	20.39	43.86
20.6	27.830 251	25.47 224	36.063 173	69.64 62	9.789 157	19.36 76	20.80 41	46.67 281
30.5	28.034 204	27.70 223	36.207 144	70.13 49	9.917 128	20.31 95	21.11 31	49.54 287
May 10.5	28.191 157	29.87 217	36.321 114	70.49 36	10.017 100	21.41 110	21.35 24	52.40 286
20.5	28.299 108	31.94 207	36.404 83	70.73 24	10.087 70	22.61 120	21.49 14	55.21 281
	58	194	54	14	41	124	6	269
30.4	28.357	33.88	36.458	70.87	10.128	23.85	21.55	57.90
June 9.4	28.365 8	35.64 176	36.479 21	70.92 5	10.140 12	25.09 124	21.52 3	60.40 250
19.4	28.323 42	37.17 153	36.471 8	70.89 3	10.123 17	26.30 121	21.41 11	62.66 226
29.4	28.233 90	38.45 128	36.432 39	70.76 13	10.077 46	27.42 112	21.21 20	64.62 196
July 9.3	28.098 135	39.45 100	36.364 68	70.54 22	10.006 71	28.44 102	20.93 28	66.23 161
	176	67	94	28	95	91	34	121
19.3	27.922	40.12	36.270	70.26	9.911	29.35	20.59	67.44
29.3	27.711 211	40.45 33	36.152 118	69.89 37	9.794 117	30.10 75	20.19 40	68.22 78
Aug. 8.3	27.475 236	40.41 4	36.017 135	69.44 45	9.661 133	30.71 61	19.74 45	68.52 30
18.2	27.224 251	40.01 40	35.868 149	68.92 52	9.515 146	31.14 43	19.27 47	68.34 18
28.2	26.966 258	39.24 77	35.714 154	68.35 57	9.364 151	31.38 24	18.80 47	67.68 66
	251	111	152	61	149	6	46	114
Sept. 7.2	26.715	38.13	35.562	67.74	9.215	31.44	18.34	66.54
17.1	26.485 230	36.73 140	35.421 141	67.11 63	9.074 141	31.28 16	17.93 41	64.97 157
27.1	26.290 195	35.05 168	35.302 119	66.50 61	8.953 121	30.91 37	17.56 37	63.01 196
Oct. 7.1	26.143 147	33.20 185	35.211 91	65.94 56	8.857 96	30.30 61	17.27 29	60.74 227
17.1	26.054 89	31.21 199	35.159 52	65.49 45	8.796 61	29.47 83	17.08 19	58.22 252
	20	202	7	34	20	109	8	265
27.0	26.034	29.19	35.152	65.15	8.776	28.38	17.00	55.57
Nov. 6.0	26.088 54	27.21 198	35.195 43	64.99 16	8.801 25	27.07 131	17.05 5	52.89 238
16.0	26.221 133	25.37 184	35.291 96	65.04 5	8.876 75	25.52 155	17.21 16	50.29 230
26.0	26.430 209	23.75 162	35.440 149	65.31 27	9.001 125	23.77 175	17.50 29	47.85 244
Dec. 5.9	26.712 282	22.41 134	35.639 199	65.82 51	9.173 172	21.87 190	17.91 41	45.70 215
	346	99	244	75	216	202	52	190
15.9	27.058	21.42	35.883	66.57	9.389	19.85	18.43	43.90
25.9	27.458 400	20.81 61	36.164 281	67.53 96	9.642 253	17.77 208	19.03 60	42.51 139
35.8	27.899 441	20.60 21	36.474 310	68.68 115	9.924 282	15.69 208	19.71 68	41.61 90
Mean Place	23.112	16.48	32.607	56.34	6.687	34.92	13.917	40.68
Sec δ, Tan δ	1.617	-1.270	1.061	-0.354	1.004	+0.092	2.715	-2.523
Dψ α, Dω α	+0.08	-0.06	+0.07	-0.02	+0.06	0.00	+0.11	-0.11
Dψ δ, Dω δ	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington in Time.	δ Boötis. Mag. 3.5		β Libræ. Mag. 2.7		γ Ursæ Minoris. Mag. 3.1		μ Boötis pr. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 12 s	° ' +33 36 "	h m 15 12 s	° ' - 9 4 "	h m 15 20 s	° ' +72 7 "	h m 15 21 s	° ' +37 39 "
a. 0.9	11.650	57.49	35.800	55.56	47.99	13.19	23.233	35.90
10.8	11.966 316	54.87 262	36.108 308	57.14 158	48.59 60	10.54 265	23.550 317	33.21 269
20.8	12.303 337	52.63 224	36.429 321	58.74 160	49.27 68	8.42 212	23.890 340	30.90 231
30.8	12.650 347	50.84 179	36.755 326	60.29 155	50.00 73	6.90 152	24.246 356	29.06 184
b. 9.7	12.997 347 338	49.57 127 73	37.077 322 310	61.73 144 128	50.77 77 76	6.06 84 18	24.603 357 350	27.76 130 73
19.7	13.335	48.84	37.387	63.01	51.53	5.88	24.953	27.03
ur. 1.7	13.655 320	48.68 16	37.681 294	64.11 110	52.27 74	6.40 52	25.288 335	26.90 13
11.7	13.951 296	49.07 39	37.954 273	64.99 88	52.96 69	7.57 117	25.598 310	27.36 46
21.6	14.217 266	49.99 92	38.202 248	65.64 65	53.57 61	9.32 175	25.881 283	28.36 100
31.6	14.450 233 196	51.38 139 179	38.424 222 196	66.07 43 21	54.09 52 41	11.60 228 269	26.128 247 210	29.85 149 190
ur. 10.6	14.646 160	53.17	38.620	66.28	54.50	14.29	26.338	31.75
20.6	14.806 121	55.27 210	38.787 167	66.30 14	54.80 19	17.29 300	26.509 171	34.00 226
30.5	14.927 82	57.60 233	38.927 140	66.16 28	54.99 6	20.49 320	26.641 132	36.49 249
ly 10.5	15.009 46	60.06 246	39.038 111	65.88 38	55.05 6	23.76 327	26.732 91	39.13 264
20.5	15.055 8	62.57 251 247	39.119 81 53	65.50 46	54.99 19	27.01 325 311	26.782 50 10	41.81 268 265
30.4	15.063 28	65.04 236	39.172 22	65.04 52	54.80 28	30.12 289	26.792 29	44.46 252
ne 9.4	15.035 62	67.40 217	39.194 6	64.52 55	54.52 38	33.01 257	26.763 67	46.98 233
19.4	14.973 93	69.57 193	39.188 37	63.97 56	54.14 47	35.58 220	26.696 101	49.31 206
29.4	14.880 126	71.50 163	39.151 63	63.41 58	53.67 56	37.78 177	26.595 133	51.39 177
ly 9.3	14.755 149	73.13 130	39.088 89	62.83 57	53.11 61	39.55 129	26.462 163	53.16 143
19.3	14.606 173	74.43 96	38.999 112	62.26 55	52.50 66	40.84 78	26.299 186	54.59 104
29.3	14.433 189	75.39 56	38.887 130	61.71 53	51.84 68	41.62 27	26.113 206	55.63 63
ug. 8.3	14.244 201	75.95 16	38.757 143	61.18 50	51.16 71	41.89 27	25.907 219	56.26 21
18.2	14.043 205	76.11 24	38.614 149	60.68 45	50.45 71	41.62 79	25.688 224	56.47 22
28.2	13.838 202	75.87 64	38.465 147	60.23 39	49.74 69	40.83 129	25.464 222	56.25 64
pt. 7.2	13.636 190	75.23 105	38.318 138	59.84 30	49.05 66	39.54 179	25.242 210	55.61 106
17.1	13.446 168	74.18 143	38.180 119	59.54 19	48.39 60	37.75 224	25.032 191	54.53 148
27.1	13.278 140	72.75 180	38.061 92	59.35 8	47.79 52	35.51 267	24.841 161	53.05 187
t. 7.1	13.138 102	70.95 216	37.969 56	59.27 9	47.27 45	32.84 303	24.680 123	51.18 224
17.1	13.036 56	68.79 248	37.913 14	59.36 27	46.82 34	29.81 333	24.557 77	48.94 257
27.0	12.980 5	66.31 273	37.899 33	59.63 46	46.48 22	26.48 357	24.480 24	46.37 284
v. 6.0	12.975 50	63.58 294	37.932 84	60.09 69	46.26 9	22.91 372	24.456 32	43.53 308
16.0	13.025 106	60.64 311	38.016 134	60.78 90	46.17 4	19.19 377	24.488 93	40.45 321
26.0	13.131 161	57.53 316	38.150 182	61.68 111	46.21 18	15.42 373	24.581 149	37.24 328
c. 5.9	13.292 213	54.37 314	38.332 226	62.79 129	46.39 30	11.69 357	24.730 203	33.96 325
15.9	13.505 258	51.23 300	38.558 263	64.08 144	46.69 45	8.12 331	24.933 253	30.71 312
25.9	13.763 295	48.23 280	38.821 290	65.52 154	47.14 54	4.81 293	25.186 294	27.59 289
35.8	14.058	45.43	39.111	67.06	47.68	1.88	25.480	24.70
Place	11.825	72.06	35.518	52.13	50.946	32.68	23.562	50.80
, Tan δ	1.201	+0.665	1.013	-0.160	3.257	+3.100	1.263	+0.772
D _a	+0.05	+0.03	+0.06	-0.01	0.00	+0.13	+0.05	+0.03
D _{δ}	-0.3	-0.7	-0.3	-0.7	-0.3	-0.8	-0.3	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ^1 Serpentis. Mag. 5.5		ι Draconis. Mag. 3.5		β Libræ. Mag. 5.9		β Coronæ Borealis. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 21 s	° ' +15 42 "	h m 15 23 s	° ' +59 14 "	h m 15 23 s	° ' -16 25 "	h m 15 24 s	° ' +29 22 "
Jan. 0.9	59.156	46.12	5.023	52.11	37.990	54.69	26.731	62.60
10.8	59.448 ²⁹²	43.81 ²³¹	5.433 ⁴¹⁰	49.32 ²⁷⁹	38.304 ³¹⁴	55.95 ¹²⁶	27.032 ³⁰¹	60.00 ²⁰⁰
20.8	59.758 ³¹⁰	41.73 ²⁰⁸	5.888 ⁴⁵⁵	47.03 ²²⁹	38.632 ³²⁸	57.29 ¹³⁴	27.353 ³²¹	57.73 ²²⁷
30.8	60.075 ³¹⁷	39.94 ¹⁷⁹	6.371 ⁴⁸³	45.32 ¹⁷¹	38.966 ³³⁴	58.67 ¹³⁸	27.687 ³³⁴	55.87 ¹⁸⁶
Feb. 9.8	60.393 ³¹⁸	38.50 ¹⁴⁴	6.868 ⁴⁹⁷	44.25 ¹⁰⁷	39.299 ³³³	60.02 ¹³⁵	28.022 ³³⁵	54.48 ¹³⁹
	308	103	491	40	323	128	328	95
19.7	60.701	37.47	7.359	43.85	39.622	61.30	28.350	53.63
Mar. 1.7	60.996 ²⁹⁵	36.88 ⁵⁹	7.833 ⁴⁷⁴	44.12 ²⁷	39.928 ³⁰⁶	62.46 ¹¹⁶	28.663 ³¹³	53.30 ³³
11.7	61.270 ²⁷⁴	36.72 ¹⁶	8.274 ⁴⁴¹	45.05 ⁹³	40.216 ²⁸⁸	63.49 ¹⁰³	28.956 ²⁹³	53.52 ²²
21.6	61.520 ²⁵⁰	36.99 ²⁷	8.670 ³⁹⁶	46.57 ¹⁵²	40.480 ²⁶⁴	64.36 ⁸⁷	29.222 ²⁶⁶	54.24 ⁷²
31.6	61.743 ²²³	37.65 ⁶⁶	9.013 ³⁴³	48.63 ²⁰⁶	40.720 ²⁴⁰	65.06 ⁷⁰	29.458 ²³⁶	55.44 ¹²⁰
	194	101	283	249	212	55	204	159
Apr. 10.6	61.937	38.66	9.296	51.12	40.932	65.61	29.662	57.03
20.6	62.101 ¹⁶⁴	39.96 ¹³⁰	9.513 ¹⁴⁸	53.95 ²⁸³	41.118 ¹⁸⁶	66.00 ³⁹	29.831 ¹⁶⁹	58.95 ¹⁹²
30.5	62.236 ¹³⁵	41.48 ¹⁵²	9.661 ⁸⁰	57.01 ³⁰⁶	41.275 ¹⁵⁷	66.24 ²⁴	29.965 ¹³⁴	61.11 ²¹⁶
May 10.5	62.339 ¹⁰³	43.17 ¹⁶⁹	9.741 ¹¹	60.18 ³¹⁷	41.402 ¹²⁷	66.37 ¹³	30.064 ⁹⁹	63.43 ²³²
20.5	62.411 ⁷²	44.94 ¹⁷⁷	9.752 ⁵⁶	63.37 ³¹⁹	41.501 ⁹⁹	66.40 ³	30.126 ⁶²	65.82 ²³⁹
	41	179		307	67	6	26	238
30.5	62.452 ¹⁰	46.73 ¹⁷⁶	9.696	66.44	41.568	66.34	30.152	68.20
June 9.4	62.462 ²⁰	48.49 ¹⁶⁶	9.578 ¹¹⁸	69.35 ²⁹¹	41.603 ³⁵	66.20 ¹⁴	30.144 ⁸	70.50 ²²⁹
19.4	62.442 ⁴⁹	50.15 ¹⁵⁴	9.400 ¹⁷⁸	71.97 ²⁶²	41.608 ⁵	66.00 ²⁰	30.103 ⁴¹	72.64 ²¹⁴
29.4	62.393 ⁷⁹	51.69 ¹³⁶	9.169 ²³¹	74.25 ²²⁸	41.581 ²⁷	65.74 ²⁶	30.028 ⁷⁵	74.57 ¹⁹³
July 9.3	62.314 ¹⁰³	53.05 ¹¹⁴	8.890 ²⁷⁹	76.15 ¹⁹⁰	41.523 ⁵⁸	65.44 ³⁰	29.922 ¹⁰⁶	76.24 ¹⁶⁷
			320	145	85	35	132	138
19.3	62.211 ¹²⁷	54.19 ⁹³	8.570 ³⁵²	77.60 ⁹⁶	41.438	65.09	29.790	77.62 ¹⁰⁶
29.3	62.084 ¹⁴⁴	55.12 ⁶⁷	8.218 ³⁷⁷	78.56 ⁴⁶	41.327 ¹¹¹	64.69 ⁴⁰	29.633 ¹⁵⁷	78.67 ⁶⁹
Aug. 8.3	61.940 ¹³⁸	55.79 ⁴¹	7.841 ³⁹⁰	79.02 ⁴	41.197 ¹³⁰	64.25 ⁴⁴	29.457 ¹⁷⁶	79.36 ³²
18.2	61.782 ¹⁶⁶	56.20 ¹³	7.451 ³⁹⁶	78.98 ⁵⁵	41.051 ¹⁴⁶	63.78 ⁴⁷	29.269 ¹⁸⁸	79.68 ⁵
28.2	61.616 ¹⁶⁴	56.33 ¹⁶	7.055 ³⁸⁸	78.43 ¹⁰⁷	40.896 ¹⁵⁵	63.29 ⁴⁹	29.073 ¹⁹⁶	79.63 ⁴³
					155	51	195	
Sept. 7.2	61.452	56.17	6.667	77.36	40.741	62.78	28.878	79.20
17.2	61.295 ¹⁵⁷	55.73 ⁴⁴	6.298 ³⁶⁹	75.81 ¹⁵⁵	40.595 ¹⁴⁶	62.28 ⁵⁰	28.692 ¹⁸⁶	78.38 ⁸²
27.1	61.156 ¹³⁹	54.99 ⁷⁴	5.960 ³³⁸	73.80 ²⁰¹	40.467 ¹²⁸	61.82 ⁴⁶	28.525 ¹⁶⁷	77.18 ¹²⁰
Oct. 7.1	61.041 ¹¹⁵	53.95 ¹⁰⁴	5.665 ²⁹⁵	71.36 ²⁴⁴	40.365 ¹⁰²	61.43 ³⁹	28.384 ¹⁴¹	75.61 ¹⁵⁷
17.1	60.961 ⁸⁰	52.64 ¹³¹	5.427 ²³⁸	68.54 ²⁸²	40.299 ⁶⁶	61.14 ²⁹	28.280 ¹⁰⁴	73.72 ¹⁹⁹
	40	161	174	316	23	16	62	223
27.0	60.921	51.03	5.253	65.38	40.276	60.98	28.218	71.49
Nov. 6.0	60.927 ⁶	49.18 ¹⁸⁵	5.153 ¹⁰⁰	61.95 ³⁴³	40.302 ²⁶	60.98 ⁰	28.204 ¹⁴	68.98 ²⁵¹
16.0	60.983 ⁵⁶	47.08 ²¹⁰	5.133 ²⁰	58.34 ³⁶¹	40.379 ⁷⁷	61.18 ²⁰	28.243 ³⁹	66.25 ²⁷³
26.0	61.089 ¹⁰⁶	44.80 ²²⁸	5.199 ⁶⁶	54.63 ³⁷¹	40.509 ¹³⁰	61.59 ⁴¹	28.338 ⁹⁵	63.35 ²⁹⁰
Dec. 5.9	61.245 ¹⁵⁶	42.39 ²⁴¹	5.350 ¹⁵¹	50.92 ³⁷¹	40.689 ¹⁸⁰	62.22 ⁶³	28.485 ¹⁴⁷	60.35 ³⁰⁰
	202	248	234	359	226	83	198	301
15.9	61.447	39.91	5.584	47.33	40.915	63.05	28.683	57.34
25.9	61.689 ²⁴²	37.42 ²⁴⁹	5.892 ³⁰⁸	43.95 ³³⁸	41.180 ²⁶⁵	64.07 ¹⁰²	28.926 ²⁴³	54.42 ²⁹²
35.9	61.962 ²⁷³	35.02 ²⁴⁰	6.267 ³⁷⁵	40.91 ³⁰⁴	41.475 ²⁹⁵	65.26 ¹¹⁹	29.204 ²⁷⁸	51.66 ²⁷⁶
Mean Place	59.103	55.98	6.326	70.30	37.733	53.38	26.896	75.59
Sec δ , Tan δ	1.039	+0.281	1.956	+1.681	1.043	-0.295	1.148	+0.563
$D\alpha, D_{\alpha} \alpha$	+0.06	+0.01	+0.03	+0.07	+0.07	-0.01	+0.05	+0.02
$D\delta, D_{\delta} \delta$	-0.3	-0.8	-0.3	-0.8	-0.3	-0.8	-0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	γ^1 Boötis. Mag. 5.2		γ Lupi (mean). Mag. 3.0		γ Libræ. Mag. 4.0		α Coronæ Borealis. Mag. 2.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 27 s	° ' +41 6 "	h m 15 29 s	° ' -40 53 "	h m 15 30 s	° ' -14 31 "	h m 15 31 s	° ' +26 59 "
a. 0.9	58.568	27.85	40.410	27.71	56.431	2.19	12.772	11.48
10.8	58.887 319	25.07 278	40.790 380	27.93 22	56.738 307	3.49 130	13.066 204	8.90 258
20.8	59.235 348	22.71 236	41.193 403	28.45 52	57.060 322	4.85 136	13.381 315	6.63 227
30.8	59.599 364	20.84 187	41.604 411	29.24 79	57.389 329	6.22 137	13.708 327	4.73 190
b. 9.8	59.968 369 364	19.51 133 73	42.014 410 400	30.25 101 122	57.718 329 321	7.54 132 122	14.039 331 325	3.30 143 94
19.7	60.332	18.78	42.414	31.47	58.039	8.76	14.364	2.36
ur. 1.7	60.681 349	18.66 12	42.799 385	32.83 136	58.345 306	9.86 110	14.674 310	1.96 40
11.7	61.008 327	19.15 49	43.161 362	34.30 147	58.633 288	10.81 95	14.967 293	2.07 11
21.7	61.304 296	20.19 104	43.497 336	35.85 155	58.899 266	11.57 76	15.233 266	2.68 61
31.6	61.566 262 224	21.76 157 200	43.802 305 275	37.44 159 161	59.142 243 216	12.16 59 42	15.473 240 208	3.76 106 148
ur. 10.6	61.790	23.76	44.077	39.05	59.358	12.58	15.681	5.24
20.6	61.972 182	26.10 234	44.317 240	40.65 160	59.549 191	12.82 24	15.856 175	7.04 180
30.5	62.113 141	28.70 260	44.522 205	42.22 157	59.711 162	12.94 12	15.998 142	9.10 206
ly 10.5	62.210 97	31.45 275	44.688 166	43.74 152	59.845 134	12.93 1	16.105 107	11.32 222
20.5	62.264 54 10	34.26 281 278	44.816 128 87	45.18 144 135	59.948 103 73	12.83 10 19	16.177 72 37	13.63 231 231
30.5	62.274	37.04	44.903 46	46.53 122	60.021 42	12.64 26	16.214 4	15.94 224
ne 9.4	62.244 30	39.68 264	44.949 5	47.75 107	60.063 10	12.38 30	16.218 31	18.18 210
19.4	62.173 71	42.14 246	44.954 38	48.82 91	60.073 22	12.08 35	16.187 64	20.28 192
29.4	62.064 109	44.32 218	44.916 79	49.73 70	60.051 51	11.73 37	16.123 94	22.20 167
ly 9.4	61.921 143 174	46.19 187 151	44.837 115	50.43 49	60.000 82	11.36 41	16.029 123	23.87 140
19.3	61.747	47.70 110	44.722 149	50.92 23	59.918 108	10.95 43	15.906 147	25.27 106
29.3	61.546 201	48.80 68	44.573 176	51.15 2	59.810 129	10.52 44	15.759 168	26.35 74
ig. 8.3	61.325 221	49.48 25	44.397 195	51.13 29	59.681 144	10.08 47	15.591 182	27.09 39
18.2	61.090 235	49.73 21	44.202 206	50.84 55	59.537 155	9.61 47	15.409 190	27.48 4
28.2	60.848 242 241	49.52 66	43.996 207	50.29 81	59.382 156	9.14 46	15.219 191	27.52 34
pt. 7.2	60.607	48.86	43.789 195	49.48 103	59.226 148	8.68 43	15.028 183	27.18 71
17.2	60.377 230	47.77 109	43.594 171	48.45 122	59.078 132	8.25 39	14.845 165	26.47 107
27.1	60.168 209	46.24 153	43.423 137	47.23 136	58.946 106	7.86 30	14.680 140	25.40 143
st. 7.1	59.988 180	44.30 194	43.286 92	45.87 145	58.840 71	7.56 19	14.540 106	23.97 177
17.1	59.846 142 93	42.00 230 266	43.194 38	44.42 146	58.769 30	7.37 6	14.434 64	22.20 210
27.1	59.753	39.34	43.156 24	42.96 141	58.739 18	7.31 10	14.370 17	20.10 237
iv. 6.0	59.713 40	36.40 294	43.180 87	41.55 130	58.757 69	7.41 31	14.353 35	17.73 262
16.0	59.732 19	33.24 316	43.267 153	40.25 110	58.826 121	7.72 50	14.388 88	15.11 278
26.0	59.812 80	29.92 332	43.420 215	39.15 88	58.947 170	8.22 72	14.476 143	12.33 291
xc. 5.9	59.952 140 200	26.54 338 334	43.635 271	38.27 59	59.117 217	8.94 91	14.619 192	9.42 263
15.9	60.152	23.20	43.906 320	37.68 29	59.334 257	9.85 109	14.811 234	6.49 287
25.9	60.402 250	19.98 324	44.226 360	37.39 1	59.591 286	10.94 123	15.045 273	3.62 272
35.9	60.698 296	17.02 296	44.586	37.40	59.877	12.17	15.318	0.90
n Place	59.037	42.99	40.217	32.30	56.209	0.44	12.931	23.59
δ , Tan δ	1.327	+0.873	1.323	-0.866	1.033	-0.259	1.122	+0.509
δ , D α	+0.04	+0.04	+0.08	-0.04	+0.07	-0.01	+0.05	+0.02
δ , D δ	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Cor. Bor. seq. Mag. 5.1		α Serpentis. Mag. 2.8		β Serpentis. Mag. 3.7		κ Serpentis. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 36	° ' +36 53	h m 15 40	° ' + 6 40	h m 15 42	° ' +15 40	h m 15 45	° ' +18 23
	s	"	s	"	s	"	s	"
Jan. 0.9	17.007	51.13	13.716	51.11	24.137	30.29	2.771	28.61
10.9	17.311 304	48.36 277	13.998 282	49.07 204	24.416 279	27.96 233	3.048 277	26.20 241
20.8	17.641 330	45.97 239	14.299 301	47.15 192	24.717 301	25.85 211	3.349 301	24.03 217
30.8	17.987 346	44.03 194	14.609 310	45.44 171	25.028 311	24.01 184	3.661 312	22.15 188
Feb. 9.8	18.341 354	42.62 141	14.922 313	43.99 145	25.343 315	22.53 148	3.978 317	20.65 150
	348	86	306	112	311	108	312	107
19.7	18.689	41.76	15.228	42.87	25.654	21.45	4.290	19.58
Mar. 1.7	19.026 337	41.49 27	15.524 296	42.09 78	25.953 299	20.80 65	4.592 302	18.96 62
11.7	19.343 317	41.81 32	15.803 279	41.67 42	26.236 283	20.59 21	4.878 286	18.81 15
21.7	19.633 290	42.69 88	16.060 257	41.62 5	26.497 261	20.82 23	5.142 264	19.11 30
31.6	19.892 259	44.07 138	16.296 236	41.92 30	26.736 239	21.45 63	5.384 242	19.84 73
	224	183	209	61	211	99	213	111
Apr. 10.6	20.116	45.90	16.505	42.53	26.947	22.44	5.597	20.95
20.6	20.303 187	48.08 218	16.688 183	43.40 87	27.131 184	23.75 131	5.784 187	22.37 142
30.6	20.451 148	50.52 244	16.843 155	44.48 108	27.284 153	25.30 155	5.939 155	24.05 166
May 10.5	20.559 108	53.15 263	16.969 126	45.74 126	27.408 124	27.02 172	6.063 124	25.90 185
20.5	20.627 68	55.85 270	17.067 98	47.09 135	27.501 93	28.84 182	6.157 94	27.85 195
	28	269	66	140	60	186	60	200
30.5	20.655	58.54	17.133	48.49	27.561	30.70	6.217	29.85
June 9.4	20.643 12	61.12 258	17.169 36	49.90 141	27.589 28	32.53 183	6.244 27	31.81 196
19.4	20.594 49	63.54 242	17.174 5	51.27 137	27.586 3	34.29 176	6.239 5	33.69 168
29.4	20.507 87	65.72 218	17.147 27	52.55 128	27.550 36	35.91 162	6.201 38	35.43 174
July 9.4	20.385 122	67.62 190	17.090 57	53.72 117	27.483 67	37.38 147	6.131 70	36.98 155
	152	155	84	104	95	125	98	133
19.3	20.233	69.17	17.006	54.76	27.388	38.63	6.033	38.31
29.3	20.055 178	70.35 118	16.895 111	55.64 88	27.267 121	39.67 104	5.908 125	39.40 109
Aug. 8.3	19.854 201	71.13 78	16.764 131	56.34 70	27.126 141	40.45 78	5.762 146	40.21 81
18.3	19.637 217	71.50 37	16.617 147	56.86 52	26.966 160	40.99 54	5.598 164	40.75 54
28.2	19.412 225	71.44 6	16.459 158	57.17 31	26.798 168	41.21 22	5.424 174	40.97 22
	225	48	160	11	172	4	177	7
Sept. 7.2	19.187	70.96	16.299	57.28	26.626	41.17	5.247	40.90
17.2	18.971 216	70.04 92	16.144 155	57.17 11	26.461 165	40.82 35	5.075 172	40.50 40
27.1	18.771 200	68.71 133	16.003 141	56.81 36	26.308 153	40.18 64	4.918 157	39.78 72
Oct. 7.1	18.600 171	66.97 174	15.885 118	56.22 59	26.180 128	39.25 93	4.782 136	38.75 103
17.1	18.464 136	64.86 211	15.799 86	55.40 82	26.082 98	38.01 124	4.678 104	37.41 134
	92	246	48	108	59	152	64	164
27.1	18.372	62.40	15.751	54.32	26.023	36.49	4.614	35.77
Nov. 6.0	18.331 41	59.66 274	15.748 3	53.01 131	26.009 14	34.71 178	4.594 20	33.87 190
16.0	18.346 15	56.67 299	15.793 45	51.46 155	26.044 35	32.67 204	4.623 29	31.70 217
26.0	18.419 73	53.51 316	15.889 96	49.71 175	26.130 86	30.45 222	4.704 81	29.35 235
Dec. 6.0	18.550 131	50.26 325	16.033 144	47.80 191	26.266 136	28.07 238	4.835 131	26.85 250
	188	324	189	204	183	246	179	260
15.9	18.738	47.02	16.222	45.76	26.449	25.61	5.014	24.25
25.9	18.973 235	43.88 314	16.452 230	43.67 209	26.673 224	23.14 247	5.236 222	21.68 257
35.9	19.252 279	40.95 293	16.715 263	41.59 208	26.933 260	20.73 241	5.493 257	19.19 249
Mean Place	17.411	64.95	13.655	58.05	24.182	39.29	2.863	38.11
Sec δ, Tan δ	1.250	+0.751	1.007	+0.117	1.039	+0.281	1.054	+0.332
Dψ a, Dω a	+0.04	+0.03	+0.06	0.00	+0.05	+0.01	+0.05	+0.01
Dψ δ, Dω δ	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Triang. Aust. Mag. 3.0		λ Libræ. Mag. 5.1		γ Serpentis. Mag. 3.9		π Scorpii. Mag. 3.0	
	Right Ascension.		Right Ascension.		Right Ascension.		Right Ascension.	
	Declina- tion.	Declina- tion.	Declina- tion.	Declina- tion.	Declina- tion.	Declina- tion.	Declina- tion.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	15 47	-63 10	15 48	-19 55	15 52	+15 55	15 53	-25 52
	s	"	s	"	s	"	s	"
Jan. 0.9	53.92	36.22	34.390	23.22	39.783	33.78	53.410	43.56
10.9	54.50 ⁵⁸	35.33 ⁸⁹	34.696 ³⁰⁶	24.19 ⁹⁷	40.056 ²⁷³	31.41 ²³⁷	53.725 ³¹⁵	44.23 ⁶⁷
20.8	55.10 ⁶⁰	34.87 ⁴⁶	35.020 ³²⁴	25.26 ¹⁰⁷	40.351 ²⁹⁵	29.25 ²¹⁶	54.059 ³³⁴	45.05 ⁸²
30.8	55.73 ⁶³	34.84 ³	35.355 ³³⁵	26.40 ¹¹⁴	40.660 ³⁰⁹	27.36 ¹⁸⁹	54.407 ³⁴⁸	45.98 ⁹³
Feb. 9.8	56.38 ⁶⁵	35.23 ³⁹	35.692 ³³⁷	27.56 ¹¹⁶	40.974 ³¹⁴	25.82 ¹⁵⁴	54.757 ³⁵⁰	47.00 ¹⁰²
	64	79	332	112	311	115	346	105
19.7	57.02	36.02	36.024	28.68	41.285	24.67	55.103	48.05
Mar. 1.7	57.64 ⁶²	37.17 ¹¹⁵	36.344 ³²⁰	29.73 ¹⁰⁵	41.586 ³⁰¹	23.96 ⁷¹	55.438 ³³⁵	49.10 ¹⁰⁵
11.7	58.22 ⁵⁸	38.64 ¹⁴⁷	36.648 ³⁰⁴	30.69 ⁹⁶	41.874 ²⁸⁸	23.70 ²⁶	55.758 ³²⁰	50.12 ¹⁰²
21.7	58.78 ⁵⁶	40.40 ¹⁷⁶	36.934 ²⁸⁶	31.53 ⁸⁴	42.141 ²⁶⁷	23.88 ¹⁸	56.058 ³⁰⁰	51.08 ⁹⁶
31.6	59.30 ⁵²	42.40 ²⁰⁰	37.196 ²⁶²	32.23 ⁷⁰	42.386 ²⁴⁵	24.46 ⁵⁸	56.337 ²⁷⁹	51.96 ⁸⁸
	46	220	239	59	219	96	253	81
Apr. 10.6	59.76	44.60	37.435	32.82	42.605	25.42	56.590	52.77
20.6	60.17 ⁴¹	46.93 ²³³	37.647 ²¹²	33.28 ⁴⁶	42.798 ¹⁹³	26.71 ¹²⁹	56.818 ²²⁸	53.49 ⁷²
30.6	60.52 ³⁵	49.38 ²⁴⁵	37.833 ¹⁸⁶	33.63 ³⁵	42.961 ¹⁶³	28.23 ¹⁵²	57.016 ¹⁹⁸	54.14 ⁶⁵
May 10.5	60.81 ²⁹	51.88 ²⁵⁰	37.988 ¹⁵⁵	33.87 ²⁴	43.095 ¹³⁴	29.95 ¹⁷²	57.185 ¹⁶⁹	54.71 ⁵⁷
20.5	61.03 ²²	54.38 ²⁵⁰	38.113 ¹²⁵	34.03 ¹⁶	43.197 ¹⁰²	31.77 ¹⁸²	57.323 ¹³⁸	55.20 ⁴⁹
	14	245	95	9	70	187	104	43
30.5	61.17	56.83	38.208	34.12	43.267	33.64	57.427	55.63
June 9.4	61.22 ⁵	59.19 ²³⁶	38.268 ⁶⁰	34.15 ³	43.305 ³⁸	35.50 ¹⁸⁶	57.495 ⁶⁸	55.99 ³⁶
19.4	61.22 ⁰	61.37 ²¹⁸	38.294 ²⁶	34.12 ³	43.310 ⁵	37.28 ¹⁷⁸	57.528 ³³	56.28 ²⁹
29.4	61.14 ⁸	63.35 ¹⁹⁸	38.286 ⁸	34.03 ⁹	43.282 ²⁸	38.93 ¹⁶⁵	57.525 ³	56.50 ²²
July 9.4	60.98 ¹⁶	65.04 ¹⁶⁹	38.245 ⁴¹	33.89 ¹⁴	43.222 ⁶⁰	40.42 ¹⁴⁹	57.485 ⁴⁰	56.63 ¹³
	21	140	74	20	89	129	75	3
19.3	60.77	66.44 ¹⁰¹	38.171	33.69	43.133	41.71 ¹⁰⁶	57.410	56.66 ⁷
29.3	60.48 ²⁹	67.45 ⁶²	38.069 ¹⁰²	33.43 ²⁶	43.016 ¹¹⁷	42.77 ⁸⁰	57.304 ¹⁰⁶	56.59 ¹⁷
Aug. 8.3	60.15 ³³	68.07 ¹⁸	37.940 ¹²⁹	33.11 ³²	42.877 ¹³⁹	43.57 ⁵⁴	57.171 ¹³³	56.42 ²⁹
18.3	59.79 ³⁶	68.25 ²⁵	37.792 ¹⁴⁸	32.73 ³⁸	42.718 ¹⁵⁹	44.11 ²⁶	57.017 ¹⁵⁴	56.13 ⁴¹
28.2	59.40 ³⁹	68.00 ⁷¹	37.632 ¹⁶⁰	32.30 ⁴³	42.549 ¹⁶⁹	44.37 ³	56.847 ¹⁷⁰	55.72 ⁵²
	38		165	47	175		174	
Sept. 7.2	59.02	67.29	37.467	31.83	42.374	44.34	56.673	55.20
17.2	58.65 ³⁷	66.16 ¹¹³	37.305 ¹⁶²	31.32 ⁵¹	42.203 ¹⁷¹	44.01 ³³	56.502 ¹⁷¹	54.60 ⁶⁰
27.1	58.31 ³⁴	64.64 ¹⁵²	37.159 ¹⁴⁶	30.80 ⁵²	42.046 ¹⁵⁷	43.38 ⁶³	56.348 ¹⁵⁴	53.94 ⁶⁶
Oct. 7.1	58.04 ²⁷	62.79 ¹⁸⁵	37.038 ¹²¹	30.30 ⁵⁰	41.910 ¹³⁶	42.45 ⁹³	56.217 ¹³¹	53.22 ⁷²
17.1	57.82 ²²	60.64 ²¹⁵	36.950 ⁸⁸	29.86 ⁴⁴	41.804 ¹⁰⁶	41.21 ¹²⁴	56.120 ⁹⁷	52.53 ⁶⁹
	13	232	46	35	68	152	55	66
27.1	57.69 ³	58.32 ²⁴²	36.904 ²	29.51 ²²	41.736 ²⁴	39.69 ¹⁷⁹	56.065 ⁰	51.87 ⁵⁸
Nov. 6.0	57.66 ⁸	53.47 ²⁴³	36.960 ⁵⁴	29.29 ⁷	41.712 ²⁴	37.90 ²⁰⁴	56.065 ⁵²	51.29 ⁴⁴
16.0	57.74 ¹⁷	51.13 ²³⁴	37.067 ¹⁰⁷	29.22 ¹¹	41.736 ⁷⁵	35.86 ²²⁴	56.117 ¹⁰⁶	50.85 ²⁶
26.0	57.91 ²⁸	48.99 ¹⁸⁸	37.226 ²⁰⁸	29.65 ⁵¹	41.937 ¹⁷⁴	31.22 ²⁴⁹	56.384 ²¹²	50.50 ¹⁴
Dec. 6.0	58.19	47.11	37.434	30.16	42.111	28.73	56.596	50.64
15.9	58.56 ⁴⁵	45.57 ¹⁵⁴	37.685 ²⁵¹	30.87 ⁷¹	42.327 ²¹⁶	26.23 ²⁵⁰	56.853 ²⁵⁷	50.98 ³⁴
25.9	59.01 ⁵²	44.42 ¹¹⁵	37.968 ²⁸³	31.75 ⁸⁸	42.580 ²⁵³	23.78 ²⁴⁵	57.146 ²⁹³	51.52 ⁵⁴
35.9								
Mean Place	54.265	44.26	34.228	22.94	39.876	42.38	53.266	44.63
Sec δ , Tan δ	2.216	-1.978	1.064	-0.362	1.040	+0.285	1.111	-0.485
$D\psi a$, $D\omega a$	+0.10	-0.07	+0.07	-0.01	+0.05	+0.01	+0.07	-0.02
$D\psi \delta$, $D\omega \delta$	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8	-0.2	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington in Time.	ε Coronæ Borealis. Mag. 4.2		δ Scorpii. Mag. 2.5		θ Draconis. Mag. 4.1		β Scorpii. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 54 s	° ' +27 6 "	h m 15 55 s	° ' -22 23 "	h m 16 0 s	° ' +58 46 "	h m 16 0 s	° ' -19 34 "
n. 0.9	11.212	41.51	29.012	21.30	19.469	46.99	40.041	55.33
10.9	11.487 275	38.88 263	29.318 306	22.11 81	19.823 354	43.95 304	40.337 296	56.23 90
20.8	11.790 303	36.51 237	29.643 325	23.05 94	20.232 409	41.33 262	40.654 317	57.24 101
30.8	12.108 318	34.52 199	29.981 338	24.07 102	20.681 449	39.25 208	40.983 329	58.30 106
b. 9.8	12.433 325 325	32.97 155 106	30.322 341 338	25.13 106 106	21.154 473 482	37.76 149 82	41.319 336 331	59.37 107 106
19.8	12.758	31.91	30.660	26.19	21.636	36.94	41.650	60.42
ar. 1.7	13.074 316	31.37 54	30.987 327	27.21 102	22.113 477	36.78 16	41.973 323	61.39 97
11.7	13.373 299	31.38 1	31.299 312	28.16 95	22.571 458	37.31 53	42.280 307	62.26 87
21.7	13.654 281	31.89 51	31.593 294	29.02 86	22.998 427	38.46 115	42.571 291	63.01 76
31.6	13.908 254 228	32.89 100 141	31.865 272 248	29.78 76 64	23.381 383 332	40.21 175 224	42.841 270 247	63.64 63 60
or. 10.6	14.136	34.30	32.113	30.42	23.713	42.45	43.088	64.14
20.6	14.332 196	36.09 179	32.335 222	30.97 55	23.986 273	45.12 267	43.310 222	64.52 38
30.6	14.496 164	38.15 206	32.531 196	31.42 45	24.197 211	48.09 297	43.507 197	64.78 26
ay 10.5	14.626 130	40.40 225	32.697 166	31.78 36	24.340 143	51.26 317	43.675 168	64.96 18
20.5	14.723 97 60	42.77 237 240	32.833 136 105	32.07 29 21	24.417 77 9	54.52 326 325	43.813 138 106	65.06 10 4
30.5	14.783	45.17	32.938	32.28	24.426	57.77	43.919	65.10
ine 9.5	14.807 24	47.52 235	33.005 67	32.44 16	24.368 58	60.91 314	43.991 72	65.09 1
19.4	14.794 13	49.77 225	33.038 33	32.54 10	24.247 121	63.84 293	44.028 37	65.03 6
29.4	14.748 46	51.83 206	33.036 2	32.58 4	24.065 182	66.49 265	44.031 3	64.92 11
dy 9.4	14.667 81 112	53.67 184 156	32.998 38 71	32.55 3 9	23.827 238 287	68.81 232 191	43.997 34 67	64.77 15 19
19.3	14.555	55.23	32.927	32.46	23.540	70.72	43.930	64.58
29.3	14.415 140	56.49 126	32.825 102	32.29 17	23.211 329	72.18 146	43.834 96	64.33 25
ug. 8.3	14.249 166	57.43 94	32.696 129	32.03 26	22.847 364	73.17 99	43.708 126	64.04 29
18.3	14.067 182	58.01 58	32.546 150	31.71 32	22.458 389	73.66 49	43.562 146	63.70 34
28.2	13.873 194 199	58.22 21 16	32.381 165 109	31.30 41 48	22.054 404 407	73.63 8 54	43.401 161 168	63.31 39 44
pt. 7.2	13.674	58.06	32.212	30.82	21.647	73.09	43.233	62.87
17.2	13.479 195	57.53 53	32.047 165	30.29 53	21.250 397	72.04 106	43.070 163	62.40 47
27.2	13.297 182	56.63 90	31.894 153	29.72 57	20.874 376	70.51 153	42.917 153	61.93 47
ct. 7.1	13.139 158	55.34 129	31.766 128	29.15 57	20.532 342	68.50 201	42.788 129	61.48 45
17.1	13.012 127 88	53.70 164 197	31.671 95 53	28.60 55 48	20.237 295 235	66.06 244 282	42.690 98 56	61.07 41 33
27.1	12.924	51.73	31.618	28.12	20.002	63.24	42.634	60.74
ov. 6.0	12.882 42	49.47 226	31.614 4	27.75 37	19.834 168	60.08 316	42.623 11	60.53 21
16.0	12.891 9	46.93 254	31.663 49	27.53 22	19.744 90	56.65 343	42.665 42	60.46 7
26.0	12.954 63	44.20 273	31.765 102	27.47 6	19.736 8	53.06 359	42.761 96	60.57 11
ac. 6.0	13.069 115 167	41.34 286 293	31.921 156 205	27.62 15 33	19.814 78 161	49.38 368 365	42.908 147 196	60.86 29 48
15.9	13.236	38.41	32.126	27.95	19.975	45.73	43.104	61.34
25.9	13.450 214	35.52 289	32.374 248	28.48 53	20.217 242	42.22 351	43.342 238	62.01 67
35.9	13.703 253	32.75 277	32.657 283	29.19 71	20.530 313	38.96 326	43.617 275	62.83 82
n Place	11.491	52.38	28.874	21.59	21.100	62.13	39.924	55.00
δ, Tan δ	1.123	+0.512	1.082	-0.412	1.929	+1.650	1.062	-0.356
, D _α α	+0.05	+0.02	+0.07	-0.01	+0.02	+0.06	+0.07	-0.01
, D _α δ	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	δ Ophiuchi. Mag. 3.0			σ Cor. Bor. seq. Mag. 5.8			19 Ursæ Minoris. Mag. 5.5			γ ² Normæ. Mag. 4.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	16	10	— 3 29	16	11	+34 3	16	13	+76 4	16	13	—49 57
	s		"	s		"	s		"	s		"
a. 0.9	2.820		6.34	35.912		46.18	3.46		49.07	41.554		14.95
10.9	3.088	268	7.93 159	36.179	267	43.33 285	4.05 59		46.04 303	41.951	397	14.32 63
20.8	3.378	290	9.48 155	36.479	300	40.79 254	4.76 71		43.46 258	42.382	431	14.01 31
30.8	3.683	305	10.94 146	36.799	320	38.65 214	5.57 81		41.39 207	42.837	455	14.00 1
b. 9.8	3.994	311	12.25 131	37.133	334	36.99 166	6.46 89		39.95 144	43.302	465	14.31 31
		309	109		338	113		94	80		467	57
19.8	4.303		13.34	37.471		35.86	7.40		39.15	43.769		14.88
1.7	4.605	302	14.20 86	37.804	333	35.29 57	8.35 95		39.03 12	44.228	459	15.71 83
11.7	4.896	291	14.78 58	38.125	321	35.31 2	9.27 92		39.60 57	44.672	444	16.76 105
21.7	5.171	275	15.09 31	38.426	301	35.89 58	10.13 86		40.80 120	45.095	423	18.00 124
31.7	5.427	256	15.14 5	38.704	278	37.01 112	10.91 78		42.59 179	45.492	397	19.39 139
		236	22		250	158		67	230		367	152
10.6	5.663		14.92	38.954		38.59	11.58		44.89	45.859		20.91
20.6	5.875	212	14.49 43	39.172	218	40.58 199	12.12 54		47.61 272	46.191	332	22.54 163
30.6	6.062	187	13.88 61	39.357	185	42.88 230	12.52 40		50.64 303	46.486	295	24.24 170
10.5	6.223	161	13.10 78	39.504	147	45.41 253	12.76 24		53.87 323	46.738	252	25.98 174
20.5	6.355	132	12.24 86	39.614	110	48.07 266	12.85 9		57.19 332	46.944	206	27.74 176
		102	93		70	271		6	331		158	174
30.5	6.457		11.31	39.684		50.78	12.79		60.50	47.102		29.48
9.5	6.526	69	10.36 95	39.713	29	53.46 268	12.58 21		63.69 319	47.209	107	31.16 168
19.4	6.564	38	9.40 96	39.703	10	56.01 255	12.21 37		66.67 298	47.262	53	32.75 159
29.4	6.568	4	8.49 91	39.655	48	58.38 237	11.72 49		69.37 270	47.259	3	34.21 146
9.4	6.537	31	7.62 87	39.568	87	60.50 212	11.10 62		71.72 235	47.204	55	35.50 129
		62	80		123	182		72	194		107	106
19.4	6.475		6.82	39.445		62.32	10.38		73.66	47.097		36.56
29.3	6.384	91	6.12 70	39.291	154	63.82 150	9.56 82		75.13 147	46.943	154	37.37 81
8.3	6.265	119	5.51 61	39.110	181	64.94 112	8.67 89		76.12 99	46.746	197	37.91 54
18.3	6.126	139	4.99 52	38.905	205	65.67 73	7.74 93		76.61 49	46.518	228	38.12 21
28.2	5.971	155	4.58 41	38.686	219	65.99 32	6.78 96		76.57 4	46.266	252	38.01 11
		162	27		226	9		97	56		262	44
7.2	5.809		4.31	38.460		65.90	5.81		76.01	46.004		37.57
17.2	5.648	161	4.15 16	38.236	224	65.37 53	4.86 95		74.95 106	45.746	258	36.79 78
27.2	5.496	152	4.13 2	38.024	212	64.43 94	3.95 91		73.38 157	45.504	242	35.71 106
7.1	5.364	132	4.26 13	37.832	192	63.08 135	3.10 85		71.35 203	45.293	211	34.37 134
17.1	5.261	103	4.58 32	37.671	161	61.33 175	2.35 75		68.89 246	45.127	166	32.80 157
		67	49		122	212		65	284		110	171
27.1	5.194		5.07	37.549		59.21	1.70		66.05	45.017		31.09
6.1	5.170	24	5.75 68	37.475	74	56.76 245	1.19 51		62.87 318	44.974	43	29.29 180
16.0	5.194	24	6.63 88	37.452	23	54.04 272	0.83 36		59.43 344	45.003	29	27.49 180
26.0	5.267	73	7.71 108	37.485	33	51.10 294	0.63 20		55.84 359	45.107	104	25.75 174
6.0	5.390	123	8.97 126	37.574	89	48.00 310	0.61 2		52.16 368	45.287	180	24.17 158
		169	139		146	316		15	365		249	139
15.9	5.559		10.36	37.720		44.84	0.76		48.51	45.536		22.78
25.9	5.772	213	11.88 152	37.916	196	41.72 312	1.08 32		45.02 349	45.847	311	21.66 112
35.9	6.018	246	13.46 158	38.157	241	38.75 297	1.57 49		41.77 325	46.212	365	20.83 83
Place	2.798		2.61	36.434		57.19	8.672		64.08	41.667		20.31
, Tan δ	1.002		−0.061	1.207		+0.676	4.158		+4.036	1.554		−1.190
D _a α	+0.06		0.00	+0.05		+0.02	−0.03		+0.12	+0.09		−0.04
D _a δ	−0.2		−0.9	−0.2		−0.9	−0.2		−0.9	−0.2		−0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Scorpii. (Antares.) Mag. 1.2		β Herculis. Mag. 2.8		λ Ophiuchi. Mag. 3.8		δ Draconis Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 24 s	° ' -26 15 "	h m 16 26 s	° ' +21 39 "	h m 16 26 s	° ' + 2 9 "	h m 16 28 s	° ' + 2 9 "
Jan. 0.9	22.633	2.87	41.290	54.54	46.504	40.51	4.95	30
10.9	22.926 ²⁹³	3.29 ⁴²	41.537 ²⁴⁷	52.01 ²⁵³	46.756 ²⁵²	38.72 ¹⁷⁹	5.34 ³⁹	27
20.9	23.244 ³¹⁸	3.86 ⁵⁷	41.812 ²⁷⁵	49.68 ²³³	47.032 ²⁷⁶	37.01 ¹⁷¹	5.82 ⁴⁸	24
30.8	23.580 ³³⁶	4.55 ⁶⁹	42.107 ²⁹⁵	47.65 ²⁰³	47.325 ²⁹³	35.45 ¹⁵⁶	6.38 ⁵⁶	22
Feb. 9.8	23.925 ³⁴⁵	5.30 ⁷⁵	42.416 ³⁰⁹	46.01 ¹⁶⁴	47.628 ³⁰³	34.09 ¹²⁶	6.99 ⁶¹	20
19.8	24.270 ³⁴⁵	6.10 ⁸⁰	42.728 ³¹²	44.79 ¹²²	47.932 ³⁰⁴	32.99 ¹¹⁰	7.64 ⁶⁵	19
Mar. 1.7	24.612 ³⁴²	6.89 ⁷⁹	43.038 ³¹⁰	44.05 ⁷⁴	48.233 ³⁰¹	32.19 ⁸⁰	8.29 ⁶⁵	19
11.7	24.943 ³³¹	7.66 ⁷⁷	43.338 ³⁰⁰	43.81 ²⁴	48.525 ²⁹²	31.70 ⁴⁹	8.94 ⁶⁵	19
21.7	25.259 ³¹⁶	8.39 ⁷³	43.625 ²⁸⁷	44.07 ²⁶	48.803 ²⁷⁸	31.55 ¹⁵	9.55 ⁶¹	20
31.7	25.557 ²⁹⁸	9.06 ⁶⁷	43.893 ²⁶⁸	44.79 ⁷²	49.065 ²⁶²	31.72 ¹⁷	10.12 ⁵⁷	22
Apr. 10.6	25.835 ²⁷⁸	9.67 ⁶¹	44.139 ²⁴⁶	45.94 ¹¹⁵	49.308 ²⁴³	32.18 ⁴⁶	10.62 ⁵⁰	24
20.6	26.089 ²⁵⁴	10.22 ⁵⁵	44.360 ²²¹	47.46 ¹⁵²	49.530 ²²²	32.91 ⁷³	11.03 ⁴¹	26
30.6	26.319 ²³⁰	10.72 ⁵⁰	44.554 ¹⁹⁴	49.27 ¹⁸¹	49.727 ¹⁹⁷	33.85 ⁹⁴	11.36 ³³	29
May 10.6	26.520 ²⁰¹	11.16 ⁴⁴	44.717 ¹⁶³	51.33 ²⁰⁶	49.897 ¹⁷⁰	34.97 ¹¹²	11.60 ²⁴	33
20.5	26.689 ¹⁶⁹	11.57 ⁴¹	44.849 ¹³²	53.52 ²¹⁹	50.041 ¹⁴⁴	36.19 ¹²²	11.73 ¹³	36
30.5	26.826 ¹³⁷	11.93 ³⁶	44.947 ⁹⁸	55.78 ²²⁶	50.153 ¹¹²	37.49 ¹³⁰	11.76 ³	39
June 9.5	26.926 ¹⁰⁰	12.26 ³³	45.009 ⁶²	58.05 ²²⁷	50.233 ⁸⁰	38.81 ¹³²	11.69 ⁷	43
19.4	26.989 ⁶³	12.54 ²⁸	45.035 ²⁶	60.25 ²²⁰	50.281 ⁴⁸	40.11 ¹³⁰	11.53 ¹⁶	46
29.4	27.012 ²³	12.77 ²³	45.025 ¹⁰	62.31 ²⁰⁶	50.294 ¹³	41.35 ¹²⁴	11.26 ²⁷	49
July 9.4	26.996 ¹⁶	12.96 ¹⁹	44.979 ⁴⁶	64.21 ¹⁹⁰	50.272 ²²	42.50 ¹¹⁵	10.91 ³⁵	51
19.4	26.941 ⁵⁵	13.08 ¹²	44.898 ⁸¹	65.87 ¹⁶⁶	50.217 ⁵⁵	43.54 ¹⁰⁴	10.49 ⁴²	53
29.3	26.852 ⁸⁹	13.12 ⁴	44.784 ¹¹⁴	67.29 ¹⁴²	50.130 ⁸⁷	44.46 ⁹²	9.99 ⁵⁰	55
Aug. 8.3	26.729 ¹²³	13.07 ⁵	44.643 ¹⁴¹	68.41 ¹¹²	50.015 ¹¹⁵	45.22 ⁷⁶	9.44 ⁵⁵	56
18.3	26.581 ¹⁴⁸	12.92 ¹⁵	44.477 ¹⁶⁶	69.22 ⁸¹	49.877 ¹³⁸	45.83 ⁶¹	8.85 ⁵⁹	57
28.3	26.412 ¹⁶⁹	12.65 ²⁷	44.295 ¹⁸²	69.71 ⁴⁹	49.722 ¹⁵⁵	46.28 ⁴⁵	8.24 ⁶¹	57
Sept. 7.2	26.233 ¹⁷⁹	12.29 ³⁶	44.103 ¹⁹²	69.86 ¹⁵	49.555 ¹⁶⁷	46.54 ²⁶	7.60 ⁶⁴	57
17.2	26.052 ¹⁸¹	11.83 ⁴⁶	43.910 ¹⁹³	69.66 ²⁰	49.387 ¹⁶⁸	46.63 ⁹	6.98 ⁶²	56
27.2	25.882 ¹⁷⁰	11.28 ⁵⁵	43.724 ¹⁸⁶	69.12 ⁵⁴	49.227 ¹⁶⁰	46.53 ¹⁰	6.37 ⁶¹	55
Oct. 7.1	25.731 ¹⁵¹	10.68 ⁶⁰	43.556 ¹⁶⁸	68.23 ⁸⁹	49.083 ¹⁴⁴	46.22 ³¹	5.80 ⁵⁷	53
17.1	25.610 ¹²¹	10.04 ⁶⁴	43.414 ¹⁴²	67.00 ¹²³	48.966 ¹¹⁷	45.71 ⁵¹	5.29 ⁵¹	51
27.1	25.530 ⁸⁰	9.42 ⁶²	43.307 ¹⁰⁷	65.44 ¹⁵⁶	48.882 ⁸⁴	44.98 ⁷³	4.85 ⁴⁴	48
Nov. 6.1	25.496 ³⁴	8.84 ⁵⁸	43.243 ⁶⁴	63.58 ¹⁸⁶	48.840 ⁴²	44.04 ⁹⁴	4.50 ³⁵	45
16.0	25.516 ²⁰	8.35 ⁴⁹	43.226 ¹⁷	61.43 ²¹⁵	48.843 ³	42.88 ¹¹⁶	4.26 ²⁴	42
26.0	25.590 ⁷⁴	7.99 ³⁶	43.259 ³³	59.06 ²³⁷	48.896 ⁵³	41.52 ¹³⁶	4.11 ¹⁵	39
Dec. 6.0	25.720 ¹³⁰	7.79 ²⁰	43.344 ⁸⁵	56.50 ²⁵⁶	48.998 ¹⁰²	39.99 ¹⁵³	4.09 ²	35
16.0	25.901 ¹⁸¹	7.75 ⁴	43.480 ¹³⁶	53.85 ²⁶⁵	49.147 ¹⁴⁹	38.32 ¹⁶⁷	4.19 ¹⁰	31
25.9	26.130 ²²⁹	7.90 ¹⁵	43.662 ¹⁸²	51.17 ²⁶⁸	49.340 ¹⁹³	36.56 ¹⁷⁶	4.41 ²²	28
35.9	26.399 ²⁶⁹	8.22 ³²	43.884 ²²²	48.55 ²⁶²	49.569 ²²⁹	34.77 ¹⁷⁹	4.74 ³³	24
Mean Place	22.597	3.91	41.609	62.54	46.578	44.93	8.196	44
Sec δ , Tan δ	1.115	-0.493	1.076	+0.397	1.001	+0.038	2.783	+2
$D_{\psi} \alpha$, $D_{\omega} \alpha$	+0.07	-0.01	+0.05	+0.01	+0.06	0.00	0.00	+0
$D_{\psi} \delta$, $D_{\omega} \delta$	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9	-0.2	-0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	τ Scorpii. Mag. 2.9		σ Herculis. Mag. 4.2		ζ Ophiuchi. Mag. 2.7		24 Scorpii. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 30 s	° ' -28 2 "	h m 16 31 s	° ' +42 35 "	h m 16 32 s	° ' -10 24 "	h m 16 36 s	° ' -17 35 "
Jan. 0.9	46.485	47.94	26.654	68.53	38.481	9.02	49.682	4.47
10.9	46.778 ²⁹³	48.24 ³⁰	26.914 ²⁶⁰	65.46 ³⁰⁷	38.741 ²⁶⁰	10.20 ¹¹⁸	49.949 ²⁶⁷	5.26 ⁷⁹
20.9	47.097 ³¹⁹	48.68 ⁴⁴	27.214 ³⁰⁰	62.71 ²⁷⁵	39.025 ²⁸⁴	11.39 ¹¹⁹	50.241 ²⁹²	6.12 ⁸⁶
30.8	47.434 ³³⁷	49.24 ⁵⁶	27.545 ³³¹	60.38 ²³³	39.327 ³⁰²	12.54 ¹¹⁵	50.552 ³¹¹	7.01 ⁸⁹
Feb. 9.8	47.782 ³⁴⁸	49.89 ⁶⁵	27.897 ³⁵²	58.55 ¹⁸³	39.638 ³¹¹	13.62 ¹⁰⁸	50.872 ³²⁰	7.89 ⁸⁸
	350	72	362	125	313	95	324	83
19.8	48.132	50.61	28.259	57.30	39.951	14.57	51.196	8.72
Mar. 1.7	48.478 ³⁴⁶	51.35 ⁷⁴	28.622 ³⁶³	56.65 ⁶⁵	40.262 ³¹¹	15.35 ⁷⁸	51.517 ³²¹	9.44 ⁷²
11.7	48.816 ³³⁸	52.08 ⁷³	28.976 ³⁵⁴	56.64 ¹	40.563 ³⁰¹	15.94 ⁵⁹	51.831 ³¹⁴	10.07 ⁶³
21.7	49.140 ³²⁴	52.78 ⁷⁰	29.315 ³³⁹	57.23 ⁵⁹	40.853 ²⁹⁰	16.33 ³⁹	52.132 ³⁰¹	10.56 ⁴⁹
31.7	49.446 ³⁰⁶	53.45 ⁶⁷	29.630 ³¹⁵	58.41 ¹¹⁸	41.128 ²⁷⁵	16.50 ¹⁷	52.418 ²⁸⁶	10.91 ³⁵
	287	63	288	171	256	3	269	21
Apr. 10.6	49.733	54.08	29.918	60.12	41.384	16.47	52.687	11.12
20.6	49.996 ²⁶³	54.67 ⁵⁹	30.171 ²⁵³	62.27 ²¹⁵	41.620 ²³⁶	16.27 ²⁰	52.935 ²⁴⁸	11.22 ¹⁰
30.6	50.234 ²³⁸	55.22 ⁵⁵	30.386 ²¹⁵	64.79 ²⁵²	41.832 ²¹²	15.92 ³⁵	53.159 ²²⁴	11.22 ⁰
May 10.6	50.444 ²¹⁰	55.73 ⁵¹	30.560 ¹⁷⁴	67.57 ²⁷⁸	42.019 ¹⁸⁷	15.46 ⁴⁶	53.357 ¹⁹⁸	11.13 ⁹
20.5	50.622 ¹⁷⁸	56.21 ⁴⁸	30.691 ¹³¹	70.51 ²⁹⁴	42.178 ¹⁵⁹	14.91 ⁵⁵	53.527 ¹⁷⁰	10.98 ¹⁵
	145	44	85	303	128	60	140	20
30.5	50.767 ¹⁰⁹	56.65 ⁴¹	30.776 ³⁸	73.54 ²⁹⁸	42.306 ⁹⁷	14.31 ⁶³	53.667 ¹⁰⁶	10.78 ²²
June 9.5	50.876 ⁷⁰	57.06 ³⁸	30.814 ⁸	76.52 ²⁹⁰	42.403 ⁶¹	13.68 ⁶⁴	53.773 ⁷⁰	10.56 ²⁴
19.4	50.946 ²⁹	57.44 ³³	30.806 ⁵⁴	79.42 ²⁷⁰	42.464 ²⁶	13.04 ⁶²	53.843 ³³	10.32 ²⁵
29.4	50.975 ¹¹	57.77 ²⁸	30.752 ⁹⁹	82.12 ²⁴⁵	42.490 ¹⁰	12.42 ⁵⁹	53.876 ⁴	10.07 ²⁵
July 9.4	50.964 ⁴⁹	58.05 ²⁰	30.653 ¹⁴⁰	84.57 ²¹³	42.480 ⁴⁴	11.83 ⁵⁶	53.872 ⁴²	9.82 ²⁵
19.4	50.915 ⁸⁸	58.25 ¹³	30.513 ¹⁷⁹	86.70 ¹⁷⁷	42.436 ⁸⁰	11.27 ⁵¹	53.830 ⁷⁷	9.57 ²⁵
29.3	50.827 ¹²¹	58.38 ³	30.334 ²¹³	88.47 ¹³⁹	42.356 ¹⁰⁹	10.76 ⁴⁷	53.753 ¹¹⁰	9.32 ²⁶
Aug. 8.3	50.706 ¹⁵⁰	58.41 ⁸	30.121 ²³⁹	89.86 ⁹⁴	42.247 ¹³⁴	10.29 ⁴³	53.643 ¹³⁵	9.06 ²⁸
18.3	50.556 ¹⁷⁰	58.33 ²²	29.882 ²⁵⁹	90.80 ⁵⁰	42.113 ¹⁵³	9.86 ³⁷	53.508 ¹⁵⁶	8.78 ³⁰
28.3	50.386 ¹⁸³	58.11 ³³	29.623 ²⁶⁸	91.30 ³	41.960 ¹⁶⁵	9.49 ³²	53.352 ¹⁷⁰	8.48 ³¹
Sept. 7.2	50.203 ¹⁸⁵	57.78 ⁴⁴	29.355 ²⁷⁰	91.33 ⁴⁴	41.795 ¹⁶⁸	9.17 ²⁵	53.182 ¹⁷³	8.17 ³²
17.2	50.018 ¹⁷⁷	57.34 ⁵⁵	29.085 ²⁶¹	90.89 ⁹⁰	41.627 ¹⁶⁰	8.92 ¹⁹	53.009 ¹⁶⁵	7.85 ³²
27.2	49.841 ¹⁵⁷	56.79 ⁶³	28.824 ²⁴¹	89.99 ¹³⁶	41.467 ¹⁴⁴	8.73 ¹⁰	52.844 ¹⁵⁰	7.53 ³¹
Oct. 7.1	49.684 ¹²⁷	56.16 ⁶⁸	28.583 ²¹¹	88.63 ¹⁸⁰	41.323 ¹¹⁸	8.63 ¹	52.694 ¹²²	7.22 ²⁸
17.1	49.557 ⁸⁸	55.48 ⁶⁹	28.372 ¹⁷¹	86.83 ²²⁰	41.205 ⁸²	8.64 ¹²	52.572 ⁸⁷	6.96 ²⁰
27.1	49.469 ⁴⁰	54.79 ⁶⁷	28.201 ¹²³	84.63 ²⁵⁸	41.123 ⁴¹	8.76 ²⁸	52.485 ⁴⁴	6.76 ¹¹
Nov. 6.1	49.429 ¹²	54.12 ⁶⁰	28.078 ⁶⁷	82.05 ²³⁸	41.082 ⁶	9.04 ⁴³	52.441 ⁵	6.65 ¹
16.0	49.441 ⁶⁸	53.52 ⁴⁸	28.011 ⁸	79.17 ³¹⁴	41.088 ⁵⁷	9.47 ⁵⁹	52.446 ⁵⁶	6.66 ¹⁴
26.0	49.509 ¹²⁴	53.04 ³⁵	28.003 ⁵⁶	76.03 ³³⁰	41.145 ¹⁰⁶	10.06 ⁷⁷	52.502 ¹⁰⁸	6.80 ³¹
Dec. 6.0	49.633 ¹⁷⁸	52.69 ¹⁷	28.059 ¹¹⁷	72.73 ³³⁸	41.251 ¹⁵⁵	10.83 ⁹¹	52.610 ¹⁵⁹	7.11 ⁴⁵
16.0	49.811 ²²⁷	52.52 ⁰	28.176 ¹⁷⁵	69.35 ³³⁶	41.406 ¹⁹⁹	11.74 ¹⁰⁴	52.769 ²⁰³	7.56 ⁵⁹
25.9	50.038 ²⁶⁷	52.52 ¹⁹	28.351 ²²⁸	65.99 ³²¹	41.605 ²³⁶	12.78 ¹¹³	52.972 ²⁴²	8.15 ⁷³
35.9	50.305	52.71	28.579	62.78	41.841	13.91	53.214	8.88
Mean Place	46.472	49.29	27.549	79.28	38.495	7.11	49.686	3.93
Sec δ, Tan δ	1.133	-0.533	1.359	+0.920	1.017	-0.184	1.049	-0.317
Dψ α, Dω α	+0.07	-0.01	+0.04	+0.02	+0.07	0.00	+0.07	-0.01
Dψ δ, Dω δ	-0.2	-0.9	-0.2	-0.9	-0.1	-0.9	-0.1	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington in Time.	ε Scorpii. Mag. 2.4			49 Herculis. Mag. 6.4			ε¹ Aræ. Mag. 4.2			κ Ophiuchi. Mag. 3.4		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	16	44	-34 8	16	48	+15 6	16	53	-53 2	16	53	+ 9 29
	s		"	s		"	s		"	s		"
n. 0.9	50.853		42.23 12	20.527		33.12 230	2.185		5.18 117	46.923		60.99 205
10.9	51.149	296	42.11 —	20.755	228	30.82 230	2.559	374	4.01 117	47.149	226	58.94 205
20.9	51.475	326	42.16 5	21.015	200	28.68 214	2.980	421	3.11 90	47.404	255	57.00 194
30.8	51.824	349	42.38 22	21.295	280	26.76 192	3.434	454	2.52 59	47.680	276	55.25 175
b. 9.8	52.186	362	42.74 36	21.589	294	25.17 159	3.910	476	2.23 29	47.970	290	53.76 149
		368	48		302	123		488	2		297	117
19.8	52.554		43.22 56	21.891		23.94 82	4.398		2.21 —	48.267		52.59 81
ar. 1.8	52.920	366	43.78 62	22.193	302	23.12 37	4.890	492	2.48 27	48.566	299	51.78 41
11.7	53.280	360	44.40 68	22.490	297	22.75 7	5.375	485	2.99 51	48.861	295	51.37 3
21.7	53.628	348	45.08 71	22.778	288	22.82 50	5.848	473	3.75 96	49.147	286	51.34 —
31.7	53.960	332	45.79 72	23.052	274	23.32 90	6.300	452	4.71 116	49.420	273	51.72 73
		313			255			430			257	
or. 10.7	54.273		46.51 73	23.307		24.22 126	6.730		5.87 132	49.677		52.45 106
20.6	54.565	292	47.24 75	23.543	236	25.48 155	7.127	397	7.19 146	49.915	238	53.51 131
30.6	54.830	265	47.99 75	23.754	211	27.03 177	7.490	363	8.65 158	50.130	215	54.82 152
y 10.6	55.066	236	48.74 75	23.939	185	28.80 193	7.811	321	10.23 168	50.321	191	56.34 168
20.5	55.269	203	49.49 76	24.094	155	30.73 202	8.088	277	11.91 173	50.483	162	58.02 176
		168			123			225			131	
30.5	55.437	128	50.25 74	24.217	91	32.75 204	8.313	171	13.64 175	50.614	100	59.78 178
ne 9.5	55.565	86	50.99 71	24.308	54	34.79 201	8.484	112	15.39 173	50.714	64	61.56 176
19.5	55.651	43	51.70 67	24.362	17	36.80 191	8.596	51	17.12 167	50.778	27	63.32 168
29.4	55.694	—	52.37 62	24.379	—	38.71 177	8.647	—	18.79 155	50.805	—	65.00 156
ly 9.4	55.693	1	52.99 53	24.359	20	40.48 159	8.636	11	20.34 140	50.796	9	66.56 142
		46			56			72			44	
19.4	55.647		53.52 42	24.303		42.07 138	8.564		21.74 117	50.752		67.98 123
29.4	55.559	88	53.94 27	24.214	89	43.45 113	8.434	130	22.91 94	50.672	80	69.21 103
ig. 8.3	55.434	125	54.21 13	24.093	121	44.58 89	8.252	182	23.85 63	50.560	112	70.24 82
18.3	55.276	158	54.34 —	23.947	146	45.47 60	8.025	227	24.48 31	50.422	138	71.06 58
28.3	55.094	182	54.29 23	23.778	169	46.07 31	7.765	260	24.79 —	50.262	160	71.64 34
		198			180			284	3		173	
pt. 7.2	54.896		54.06 39	23.598		46.38 2	7.481		24.76 39	50.089		71.98 10
17.2	54.693	203	53.67 57	23.413	185	46.40 29	7.190	291	24.37 74	49.910	179	72.08 17
27.2	54.497	196	53.10 73	23.232	181	46.11 59	6.907	283	23.63 108	49.734	176	71.91 42
st. 7.2	54.318	179	52.37 83	23.065	167	45.52 89	6.646	261	22.55 136	49.571	163	71.49 69
17.1	54.170	148	51.54 91	22.920	145	44.63 119	6.424	222	21.19 161	49.430	141	70.80 95
		108			113			169			110	
27.1	54.062	60	50.63 95	22.807	74	43.44 147	6.255	107	19.58 178	49.320	72	69.85 121
rv. 6.1	54.002	3	49.68 92	22.733	28	41.97 175	6.148	33	17.80 189	49.248	27	68.64 144
16.1	53.999	—	48.76 86	22.705	—	40.22 197	6.115	—	15.91 192	49.221	—	67.20 168
26.0	54.053	54	47.90 75	22.725	20	38.25 217	6.160	45	13.99 188	49.241	20	65.52 185
c. 6.0	54.166	113	47.15 60	22.795	70	36.08 230	6.284	124	12.11 175	49.310	69	63.67 199
		170			118			203			117	
16.0	54.336		46.55 43	22.913		33.78 236	6.487		10.36 157	49.427		61.68 207
25.9	54.558	222	46.12 24	23.077	164	31.42 234	6.759	272	8.79 134	49.588	161	59.61 208
35.9	54.826	268	45.88	23.281	204	29.08	7.096	337	7.45	49.790	202	57.53
Place	50.908		44.44	20.814		38.91	2.520		9.75	47.153		65.68
l, Tan δ	1.208		-0.678	1.036		+0.270	1.663		-1.329	1.014		+0.168
D _α	+0.08		-0.01	+0.05		+0.01	+0.09		-0.03	+0.06		0.00
D _δ	-0.1		-0.9	-0.1		-1.0	-0.1		-1.0	-0.1		-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Herculis. Mag. 4.5		λ Scorpii. Mag. 1.7		β Draconis. Mag. 3.0		α Ophiuchi. Mag. 2.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 27 s	° ' " +26 10 "	h m 17 28 s	° ' " -37 2 "	h m 17 28 s	° ' " +52 21 "	h m 17 31 s	° ' " +12 36 "
Jan. 1.0	24.857	13.14	2.118	40.59	33.099	35.29	7.287	64.03
10.9	25.048 191	10.44 270	2.381 263	39.99 60	33.300 201	31.91 338	7.479 192	61.90 213
20.9	25.277 229	7.91 253	2.682 301	39.53 46	33.560 260	28.78 313	7.705 226	59.86 204
30.9	25.536 259	5.63 228	3.011 329	39.22 31	33.872 312	26.01 277	7.957 252	58.01 185
Feb. 9.8	25.817 281	3.71 192	3.364 353	39.05 17	34.225 353	23.69 232	8.229 272	56.42 159
	298	150	366	5	383	177	285	125
19.8	26.115	2.21	3.730	39.00	34.608	21.92	8.514	55.17
Mar. 1.8	26.423 308	1.19 102	4.103 373	39.06 6	35.013 405	20.75 117	8.807 293	54.29 88
11.8	26.733 310	0.69 50	4.478 375	39.21 15	35.425 412	20.25 50	9.103 296	53.81 48
21.7	27.039 306	0.74 5	4.849 371	39.45 24	35.835 410	20.40 15	9.396 293	53.77 4
31.7	27.338 299	1.30 56	5.212 363	39.76 31	36.232 397	21.20 80	9.683 287	54.15 38
	286	106	350	37	376	142	276	78
Apr. 10.7	27.624	2.36	5.562	40.13	36.608	22.62	9.959	54.93
20.7	27.892 268	3.86 150	5.896 334	40.57 44	36.953 345	24.57 195	10.219 260	56.07 114
30.6	28.137 245	5.73 187	6.208 312	41.07 50	37.261 308	26.99 242	10.462 243	57.51 144
May 10.6	28.356 219	7.92 219	6.495 287	41.65 58	37.525 264	29.78 279	10.682 220	59.20 169
20.6	28.547 191	10.33 241	6.751 256	42.29 64	37.738 213	32.87 309	10.877 195	61.07 187
	155	256	221	70	160	326	164	198
30.5	28.702	12.89	6.972	42.99	37.898	36.13	11.041	63.05
June 9.5	28.820 118	15.52 263	7.154 182	43.74 75	38.000 102	39.46 333	11.173 132	65.09 204
19.5	28.900 80	18.13 261	7.293 139	44.52 78	38.041 41	42.79 333	11.270 97	67.11 202
29.5	28.938 38	20.65 252	7.384 91	45.31 79	38.023 18	46.01 322	11.328 58	69.07 196
July 9.4	28.936 2	23.03 238	7.428 44	46.10 79	37.946 77	49.03 302	11.347 19	70.92 185
	44	218	6	75	135	278	20	168
19.4	28.892	25.21	7.422	46.85	37.811	51.81	11.327	72.60
29.4	28.808 84	27.14 193	7.367 55	47.52 67	37.621 190	54.25 244	11.268 59	74.10 150
Aug. 8.4	28.686 122	28.79 165	7.267 100	48.10 58	37.383 238	56.32 207	11.174 94	75.38 128
18.3	28.532 154	30.10 131	7.127 140	48.54 44	37.104 279	57.97 165	11.048 126	76.43 105
28.3	28.352 180	31.08 98	6.953 174	48.82 28	36.789 315	59.17 120	10.896 152	77.21 78
	200	61	198	10	338	71	173	53
Sept. 7.3	28.152	31.69	6.755	48.92	36.451	59.88	10.723	77.74
17.2	27.940 212	31.92 23	6.542 213	48.82 10	36.099 352	60.09 21	10.539 184	77.98 24
27.2	27.728 212	31.76 16	6.328 214	48.51 31	35.746 353	59.80 29	10.352 187	77.95 3
Oct. 7.2	27.522 206	31.22 54	6.123 205	48.01 50	35.402 344	58.99 81	10.173 179	77.62 33
17.2	27.334 188	30.30 92	5.940 183	47.33 68	35.080 322	57.68 131	10.011 162	77.00 62
	160	130	147	83	286	179	137	90
27.1	27.174	29.00	5.793	46.50	34.794	55.89	9.874	76.10
Nov. 6.1	27.050 124	27.34 166	5.689 104	45.56 94	34.554 240	53.65 224	9.771 103	74.92 118
16.1	26.968 82	25.34 200	5.637 52	44.55 101	34.370 184	51.01 264	9.709 62	73.48 144
26.1	26.934 34	23.08 226	5.644 7	43.52 103	34.248 122	48.01 300	9.693 16	71.79 169
Dec. 6.0	26.950 16	20.56 252	5.709 65	42.52 100	34.196 52	44.76 325	9.723 30	69.91 188
	67	267	124	93	18	343	78	205
16.0	27.017	17.89	5.833	41.59	34.214	41.33	9.801	67.86
26.0	27.134 117	15.13 276	6.012 179	40.76 83	34.305 91	37.82 351	9.925 124	65.72 214
35.9	27.296 162	12.37 276	6.244 232	40.07 69	34.464 159	34.36 346	10.091 166	63.55 217
Mean Place	25.446	17.94	2.304	42.42	34.747	41.73	7.641	67.38
Sec δ , Tan δ	1.114	+0.491	1.253	-0.755	1.638	+1.297	1.025	+0.224
$D\psi\alpha$, $D\omega\alpha$	+0.05	0.00	+0.08	-0.01	+0.03	+0.01	+0.06	0.00
$D\psi\delta$, $D\omega\delta$	-0.1	-1.0	-0.1	-1.0	-0.1	-1.0	-0.1	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♎ Serpentis. Mag. 3.6		♊ Hercules. Mag. 3.8		♉ Draconis. Mag. 4.9		♐ Pavonis. Mag. 3.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 32 s 17 32 ° ' " -15 20	h m 17 37 s 17 37 ° ' " +46 2	h m 17 37 s 17 37 ° ' " +68 47	h m 17 37 s 17 37 ° ' " -64 40				
Jan. 1.0	53.236	52.88	7.726	52.48	22.03	39.40	39.81	67.30
10.9	53.451 ²¹⁵	53.51 ⁶³	7.909 ¹⁸³	49.20 ³²⁸	22.25 ²²	35.95 ³⁴⁵	40.22 ⁴¹	65.19 ²¹¹
20.9	53.698 ²⁴⁷	54.17 ⁶⁶	8.146 ²³⁷	46.14 ³⁰⁶	22.59 ³⁴	32.71 ³²⁴	40.70 ⁴⁸	63.31 ¹⁸⁸
30.9	53.970 ²⁷²	54.83 ⁶⁶	8.426 ²⁸⁰	43.39 ²⁷⁵	23.01 ⁴²	29.84 ²⁸⁷	41.26 ⁵⁶	61.75 ¹⁵⁶
Feb. 9.8	54.260 ²⁹⁰	55.45 ⁶²	8.743 ³¹⁷	41.07 ²³²	23.52 ⁵¹	27.42 ²⁴²	41.85 ⁵⁹	60.50 ¹²⁵
19.8	54.564 ³⁰⁴	55.98 ⁵³	9.088 ³⁴⁵	39.27 ¹⁸⁰	24.09 ⁵⁷	25.57 ¹⁸⁵	42.48 ⁶³	59.58 ⁹²
Mar. 1.8	54.873 ³⁰⁹	56.41 ⁴³	9.450 ³⁶²	38.04 ¹²³	24.71 ⁶²	24.33 ¹²⁴	43.14 ⁶⁶	59.02 ⁵⁶
11.8	55.184 ³¹¹	56.68 ²⁷	9.821 ³⁷¹	37.44 ⁶⁰	25.35 ⁶⁴	23.76 ⁵⁷	43.80 ⁶⁶	58.82 ²⁰
21.7	55.493 ³⁰⁹	56.82 ¹⁴	10.192 ³⁷¹	37.50 ⁶	26.00 ⁶⁵	23.87 ¹¹	44.46 ⁶⁶	58.96 ¹⁴
31.7	55.794 ³⁰¹	56.80 ²	10.555 ³⁶³	38.17 ⁶⁷	26.62 ⁶²	24.65 ⁷⁸	45.11 ⁶⁵	59.42 ⁴⁶
Apr. 10.7	56.087 ²⁹³	56.64 ¹⁶	10.900 ³⁴⁵	39.44 ¹²⁷	27.21 ⁵⁹	26.07 ¹⁴²	45.74 ⁶³	60.19 ⁷⁷
20.7	56.366 ²⁷⁹	56.34 ³⁰	11.222 ³²²	41.26 ¹⁸²	27.76 ⁵⁵	28.04 ¹⁹⁷	46.34 ⁶⁰	61.27 ¹⁰⁸
30.6	56.628 ²⁶²	55.95 ³⁹	11.514 ²⁹²	43.54 ²²⁸	28.23 ⁴⁷	30.51 ²⁴⁷	46.89 ⁵⁵	62.62 ¹³⁵
May 10.6	56.871 ²⁴³	55.48 ⁴⁷	11.769 ²⁵⁵	46.20 ²⁶⁶	28.62 ³⁹	33.37 ²⁸⁶	47.40 ⁵¹	64.22 ¹⁶⁰
20.6	57.088 ²¹⁷	54.96 ⁵²	11.982 ²¹³	49.15 ²⁹⁵	28.92 ³⁰	36.54 ³¹⁷	47.84 ⁴⁴	66.03 ¹⁸¹
30.5	57.277 ¹⁸⁹	54.42 ⁵⁴	12.150 ¹⁶⁸	52.29 ³¹⁴	29.13 ²¹	39.91 ³³⁷	48.22 ³⁸	68.01 ¹⁹⁸
June 9.5	57.433 ¹⁵⁶	53.88 ⁵⁴	12.268 ¹¹⁸	55.52 ³²³	29.24 ¹¹	43.39 ³⁴⁸	48.52 ³⁰	70.13 ²¹²
19.5	57.554 ¹²¹	53.37 ⁵¹	12.334 ⁶⁶	58.75 ³²³	29.24 ⁰	46.84 ³⁴⁵	48.75 ²³	72.31 ²¹⁸
29.5	57.636 ⁸²	52.90 ⁴⁷	12.347 ¹³	61.91 ³¹⁶	29.14 ¹⁰	50.21 ³³⁷	48.87 ¹²	74.53 ²²²
July 9.4	57.678 ⁴²	52.48 ⁴²	12.306 ⁴¹	64.89 ²⁹⁸	28.94 ²⁰	53.39 ³¹⁸	48.91 ⁴	76.69 ²¹⁶
19.4	57.680 ²	52.10 ³⁸	12.212 ⁹⁴	67.64 ²⁷⁵	28.64 ³⁰	56.32 ²⁹³	48.91 ⁴	78.74 ²⁰⁵
29.4	57.640 ⁴⁰	51.78 ³²	12.069 ¹⁴³	70.08 ²⁴⁴	28.26 ³⁸	58.92 ²⁶⁰	48.87 ¹⁴	80.63 ¹⁸⁹
Aug. 8.4	57.562 ⁷⁸	51.50 ²⁸	11.881 ¹⁸⁸	72.18 ²¹⁰	27.80 ⁴⁶	61.14 ²²²	48.73 ²²	82.27 ¹⁶⁴
18.3	57.450 ¹¹²	51.27 ²³	11.654 ²²⁷	73.88 ¹⁷⁰	27.28 ⁵²	62.93 ¹⁷⁹	48.51 ²⁹	83.61 ¹³⁴
28.3	57.310 ¹⁴⁰	51.06 ²¹	11.393 ²⁶¹	75.15 ¹²⁷	26.70 ⁵⁸	64.25 ¹³²	48.22 ³⁶	84.60 ⁹⁹
Sept. 7.3	57.148 ¹⁶²	50.88 ¹⁸	11.108 ²⁸⁵	75.95 ⁸⁰	26.08 ⁶²	65.08 ⁸³	47.86 ⁴⁰	85.18 ⁵⁸
17.2	56.973 ¹⁷⁵	50.71 ¹⁷	10.809 ²⁹⁹	76.29 ³⁴	25.43 ⁶⁵	65.39 ³¹	47.46 ⁴³	85.32 ¹⁴
27.2	56.796 ¹⁷⁷	50.56 ¹⁵	10.505 ³⁰⁴	76.14 ¹⁵	24.77 ⁶⁶	65.18 ²¹	47.03 ⁴⁴	85.01 ³¹
Oct. 7.2	56.626 ¹⁷⁰	50.43 ¹³	10.209 ²⁹⁶	75.49 ⁶⁵	24.15 ⁶²	64.43 ⁷⁵	46.59 ⁴²	85.01 ⁷⁷
17.2	56.473 ¹⁵³	50.34 ⁹	9.931 ²⁷⁸	74.35 ¹¹⁴	23.55 ⁶⁰	63.17 ¹²⁶	46.17 ³⁷	84.24 ¹¹⁹
27.1	56.473 ¹²⁴	50.34 ⁵	9.931 ²⁴⁶	74.35 ¹⁶¹	23.55 ⁵⁶	63.17 ¹⁷⁷	45.80 ³³	83.05 ¹⁵⁹
Nov. 27.1	56.349 ⁸⁹	50.29 ²	9.685 ²⁰⁶	72.74 ²⁰⁵	22.99 ⁴⁸	61.40 ²²³	45.47 ²⁵	81.46 ¹⁹¹
6.1	56.260 ⁴⁶	50.31 ¹¹	9.479 ¹⁵⁸	70.69 ²⁴⁶	22.51 ⁴¹	59.17 ²⁶⁷	45.22 ¹⁷	79.55 ²¹⁹
16.1	56.214 ²	50.42 ²⁰	9.321 ¹⁰¹	68.23 ²⁸⁰	22.10 ³¹	56.50 ³⁰²	45.05 ⁶	77.36 ²³⁷
26.1	56.216 ⁵⁰	50.62 ³¹	9.220 ⁴⁰	65.43 ³⁰⁹	21.79 ¹⁹	53.48 ³³¹	44.99 ⁴	74.99 ²⁴⁷
Dec. 6.0	56.266 ¹⁰⁰	50.93 ⁴¹	9.180 ²³	62.34 ³²⁸	21.60 ⁹	50.17 ³⁵¹	45.03 ¹⁶	72.52 ²⁴⁷
16.0	56.366	51.34	9.203	59.06	21.51	46.66	45.19	70.05
26.0	56.513 ¹⁴⁷	51.85 ⁵¹	9.288 ⁸⁵	55.69 ³³⁷	21.54 ³	43.08 ³⁵⁸	45.44 ²⁵	67.65 ²⁴⁰
35.9	56.700 ¹⁸⁷	52.45 ⁶⁰	9.436 ¹⁴⁸	52.34 ³³⁵	21.70 ¹⁶	39.53 ³⁵⁵	45.79 ³⁵	65.41 ²²⁴
Jan Place	53.375	52.42	9.020	57.82	25.786	45.37	40.801	71.09
Δ, Tan Δ	1.037	-0.274	1.441	+1.037	2.765	+2.578	2.339	-2.114
Δα	+0.07	0.00	+0.03	+0.01	-0.01	+0.02	+0.11	-0.01
Δδ	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Ophiuchi. Mag. 2.9		ι^1 Scorpii. Mag. 3.1		μ Herculis. Mag. 3.5		ψ Draconis. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 39 s	° ' " + 4 35 "	h m 17 41 s	° ' " -40 5 "	h m 17 43 s	° ' " +27 45 "	h m 17 43 s	° ' " +72 11 "
Jan. 1.0	25.004	59.91	50.706	45.52	14.264	60.39	18.89	16.65
10.9	25.192 188	58.20 171	50.962 256	44.65 87	14.439 175	57.62 277	19.11 22	13.18 347
20.9	25.414 222	56.56 164	51.260 298	43.93 72	14.652 213	55.00 262	19.46 35	9.92 326
30.9	25.663 249	55.04 152	51.589 329	43.35 58	14.899 247	52.61 239	19.93 47	7.00 292
Feb. 9.9	25.930 267	53.72 132	51.945 356	42.92 43	15.170 271	50.58 203	20.50 57	4.53 247
	282	106	373	28	291	161	65	192
19.8	26.212	52.66 74	52.318	42.64 15	15.461	48.97 113	21.15 72	2.61 131
Mar. 1.8	26.501 289	51.92 43	52.701 383	42.49 3	15.766 305	47.84 60	21.87 74	1.30 65
11.8	26.794 293	51.49 5	53.089 388	42.46 8	16.076 310	47.24 7	22.61 75	0.65 3
21.7	27.086 292	51.44 29	53.476 387	42.54 20	16.386 310	47.17 49	23.36 73	0.68 69
31.7	27.373 287	51.73 63	53.857 381	42.74 29	16.690 304	47.66 99	24.09 70	1.37 132
	278		370		294			
Apr. 10.7	27.651	52.36 91	54.227	43.03 39	16.984	48.65 146	24.79 63	2.69 191
20.7	27.916 265	53.27 119	54.582 355	43.42 49	17.263 279	50.11 184	25.42 55	4.60 240
30.6	28.164 248	54.46 138	54.917 335	43.91 59	17.521 258	51.95 219	25.97 47	7.00 279
May 10.6	28.393 229	55.84 153	55.226 309	44.50 70	17.754 233	54.14 244	26.44 36	9.79 312
20.6	28.597 204	57.37 164	55.506 280	45.20 77	17.958 204	56.58 260	26.80 24	12.91 332
	176		244		170			
30.6	28.773	59.01 107	55.750	45.97 84	18.128	59.18 269	27.04 11	16.23 345
June 9.5	28.919 146	60.68 165	55.953 203	46.81 91	18.261 133	61.87 270	27.15 0	19.68 344
19.5	29.029 110	62.33 160	56.112 159	47.72 94	18.356 95	64.57 262	27.15 12	23.12 337
29.5	29.102 73	63.93 150	56.222 110	48.66 95	18.408 52	67.19 250	27.03 24	26.49 320
July 9.4	29.135 33	65.43 139	56.281 59	49.61 92	18.416 8	69.69 230	26.79 36	29.69 294
	5		7		34			
19.4	29.130	66.82 121	56.288	50.53 86	18.382	71.99 206	26.43 45	32.63 264
29.4	29.086 44	68.03 107	56.243 45	51.39 75	18.305 77	74.05 177	25.98 55	35.27 226
Aug. 8.4	29.005 81	69.10 87	56.148 95	52.14 62	18.189 116	75.82 146	25.43 63	37.53 184
18.3	28.891 114	69.97 67	56.010 138	52.76 45	18.039 150	77.28 111	24.80 69	39.37 138
28.3	28.750 141	70.64 47	55.834 176	53.21 24	17.860 179	78.39 73	24.11 74	40.75 90
	163		205		202			
Sept. 7.3	28.587	71.11 26	55.629	53.45 3	17.658	79.12 36	23.37 77	41.65 38
17.3	28.412 175	71.37 5	55.408 221	53.48 21	17.442 216	79.48 6	22.60 78	42.03 14
27.2	28.233 179	71.42 17	55.181 227	52.84 43	17.222 220	78.98 44	21.82 77	41.89 67
Oct. 7.2	28.060 173	70.87 38	54.962 219	52.17 67	17.008 214	78.14 84	21.05 73	41.22 119
17.2	27.903 157	70.25 83	54.763 199	51.33 100	16.808 200	76.90 162	20.32 68	40.03 170
	133		166		174			
27.1	27.770	69.42 105	54.597 123	49.21 112	16.634 141	73.32 196	19.64 61	38.33 217
Nov. 6.1	27.670 100	67.12 125	54.474 71	48.02 119	16.493 100	71.06 226	19.03 51	36.16 260
16.1	27.610 60	65.69 143	54.403 13	46.85 117	16.393 52	68.54 252	18.52 40	33.56 298
26.1	27.594 16	64.11 168	54.390 50	45.70 107	16.341 4	65.84 281	18.12 27	30.58 327
Dec. 6.0	27.624 30	62.43 171	54.440 110	44.63 96	16.337 49	63.03 282	17.85 14	27.31 348
	77		222					
16.0	27.701	60.72	54.550	43.67	16.386	60.21	17.71 0	23.83 358
26.0	27.824 123		54.718 168		16.484 98		17.71 14	20.25 354
36.0	27.987 163		54.940		16.629 145			16.71
Mean Place	25.276	62.16	50.947	47.32	14.920	64.21	23.585	21.97
Sec δ , Tan δ	1.003	+0.080	1.307	-0.842	1.130	+0.527	3.270	+3.113
$D_{\psi} a, D_{\omega} a$	+0.06	0.00	+0.08	0.00	+0.05	0.00	-0.02	+0.01
$D_{\psi} \delta, D_{\omega} \delta$	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington in Time.	γ Ophiuchi. Mag. 3.7		ξ Draconis. Mag. 3.9		89 Herculis. Mag. 5.5		85 Draconis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 43 s	° ' " + 2 44 "	h m 17 52 s	° ' " +56 52 "	h m 17 52 s	° ' " +26 3 "	h m 17 52 s	° ' " +76 58 "
n. 1.0	46.561	11.95	4.645	62.42	6.102	40.97	60.23	24.18
10.9	46.747 186	10.35 160	4.813 168	58.97 345	6.269 167	38.29 268	60.46 23	20.74 344
20.9	46.967 220	8.80 155	5.053 240	55.70 327	6.474 205	35.75 254	60.86 40	17.49 325
30.9	47.212 245	7.36 144	5.354 301	52.75 295	6.712 238	33.43 232	61.42 56	14.56 293
b. 9.9	47.479 267	6.12 124	5.709 355	50.23 252	6.977 265	31.44 199	62.15 73	12.05 251
	280	101	397	200	285	160	83	199
19.8	47.759	5.11 72	6.106	48.23 140	7.262	29.84 113	62.98	10.06 139
1.8	48.047 288	4.39 41	6.533 427	46.83 76	7.560 298	28.71 62	63.90 92	8.67 75
11.8	48.339 292	3.98 7	6.979 446	46.07 10	7.866 306	28.09 9	64.87 97	7.92 9
21.7	48.632 293	3.91 27	7.430 451	45.97 58	8.174 308	28.00 44	65.86 99	7.83 59
31.7	48.919 287	4.18 59	7.873 443	46.55 121	8.477 303	28.44 94	66.85 93	8.42 121
	280		428		295			
10.7	49.199	4.77 86	8.301	47.76 178	8.772	29.38 141	67.78	9.63 179
20.7	49.467 268	5.63 112	8.700 399	49.54 230	9.054 282	30.79 181	68.64 86	11.42 230
30.6	49.718 251	6.75 130	9.061 361	51.84 272	9.316 262	32.60 214	69.39 75	13.72 273
10.6	49.950 232	8.05 145	9.376 315	54.56 306	9.556 240	34.74 238	70.01 62	16.45 306
20.6	50.158 208	9.50 154	9.637 261	57.62 327	9.768 212	37.12 257	70.50 49	19.50 328
	182		202		179		33	
30.6	50.340	11.04 158	9.839 137	60.89 342	9.947 145	39.69 266	70.83 16	22.78 340
9.5	50.490 115	12.62 157	9.976 71	64.31 343	10.092 106	42.35 268	70.99 0	26.18 345
19.5	50.605 78	14.19 151	10.047 2	67.74 339	10.198 63	45.03 261	70.99 18	29.63 338
29.5	50.683 40	15.70 143	10.049 65	71.13 323	10.261 20	47.64 250	70.81 33	33.01 324
9.4	50.723 1	17.13 131	9.984 132	74.36 301	10.281 22	50.14 232	70.48 49	36.25 300
19.4	50.724 39	18.44 115	9.852 196	77.37 271	10.259 65	52.46 208	69.99 63	39.25 272
29.4	50.685 77	19.59 99	9.656 253	80.08 237	10.194 105	54.54 182	69.36 75	41.97 237
8.4	50.608 110	20.58 82	9.403 304	82.45 196	10.089 139	56.36 150	68.61 86	44.34 196
18.3	50.498 137	21.40 63	9.099 346	84.41 151	9.950 170	57.86 116	67.75 95	46.30 151
28.3	50.361 161	22.03 46	8.753 377	85.92 104	9.780 194	59.02 81	66.80 102	47.81 104
7.3	50.200	22.49 25	8.376 399	86.96 54	9.586 210	59.83 44	65.78 106	48.85 54
17.3	50.027 173	22.74 6	7.977 406	87.50 1	9.376 214	60.27 5	64.72 108	49.39 3
27.2	49.849 173	22.80 15	7.571 401	87.51 51	9.162 210	60.32 34	63.64 107	49.42 51
7.2	49.676 157	22.65 34	7.170 383	87.00 102	8.952 198	59.98 73	62.57 103	48.91 102
17.2	49.519 135	22.31 54	6.787 350	85.98 153	8.754 173	59.25 111	61.54 97	47.89 151
27.1	49.384 101	21.77 76	6.437 307	84.45 201	8.581 143	58.14 148	60.57 88	46.38 200
6.1	49.283 62	21.01 96	6.130 250	82.44 246	8.438 102	56.66 182	59.69 75	44.38 245
16.1	49.221 19	20.05 115	5.880 185	79.98 284	8.336 57	54.84 213	58.94 61	41.93 283
26.1	49.202 28	18.90 146	5.695 113	77.14 316	8.279 8	52.71 237	58.33 27	39.10 315
6.0	49.230 75	17.58 156	5.582 35	73.98 338	8.271 42	50.34 258	57.87 11	35.95 336
16.0	49.305 120	16.12 161	5.547 44	70.60 351	8.313 90	47.76 269	57.60 9	32.59 351
26.0	49.425 161	14.56 161	5.591 120	67.09 352	8.403 137	45.07 272	57.51 11	29.08 348
36.0	49.586	12.95	5.711	63.57	8.540	42.35	57.62	25.60
n Place	46.820	13.88	6.722	66.63	6.731	44.07	67.109	28.36
δ, Tan δ	1.001	+0.048	1.830	+1.533	1.113	+0.489	4.437	+4.323
, D _α α	+0.06	0.00	+0.02	0.00	+0.05	0.00	-0.05	+0.01
, D _α δ	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Herculis. Mag. 4.0		ν Ophiuchi. Mag. 3.5		ξ Herculis. Mag. 3.8		γ Draconis. Mag. 2.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 53 s	° ' +37 15 "	h m 17 54 s	° ' - 9 45 "	h m 17 54 s	° ' +29 15 "	h m 17 54 s	° ' +51 29 "
Jan. 1.0	25.485	34.82	30.508	53.22	34.002	18.33	40.458	49.03
10.9	25.646 ¹⁶¹	31.78 ³⁰⁸	30.696 ¹⁸⁸	54.09 ⁸⁷	34.165 ¹⁶³	15.53 ²⁸⁰	40.619 ¹⁶¹	45.64 ³³⁹
20.9	25.854 ²⁰⁸	28.85 ²⁹¹	30.918 ²²²	54.96 ⁸⁷	34.369 ²⁰⁴	12.87 ²⁰⁶	40.841 ²²²	42.43 ³²¹
30.9	26.102 ²⁴⁸	26.21 ²⁶⁴	31.167 ²⁴⁹	55.78 ⁸²	34.606 ²³⁷	10.45 ²⁴²	41.117 ²⁷⁶	39.52 ²⁹¹
Feb. 9.9	26.380 ²⁷⁸	23.94 ²²⁷	31.436 ²⁶⁹	56.50 ⁷²	34.872 ²⁶⁶	8.36 ²⁰⁹	41.439 ³²²	37.02 ²⁵⁰
	305	180	284	61	288	167	358	199
19.8	26.685	22.14	31.720	57.11	35.160	6.69	41.797	35.03
Mar. 1.8	27.006 ³²¹	20.86 ¹²⁸	32.015 ²⁹⁵	57.54 ⁴³	35.463 ³⁰³	5.51 ¹¹⁸	42.180 ³⁸³	33.63 ¹⁴⁰
11.8	27.337 ³³¹	20.15 ⁷¹	32.315 ³⁰⁰	57.77 ²³	35.774 ³¹¹	4.85 ⁶⁶	42.580 ⁴⁰⁰	32.84 ⁷⁹
21.8	27.672 ³³⁵	20.05 ¹⁰	32.615 ³⁰⁰	57.80 ³	36.087 ³¹³	4.74 ¹¹	42.985 ⁴⁰⁵	32.71 ¹³
31.7	28.003 ³³¹	20.55 ⁵⁰	32.913 ²⁹⁸	57.61 ¹⁹	36.397 ³¹⁰	5.18 ⁴⁴	43.384 ³⁹⁹	33.25 ⁵⁴
	321	105	292	38	301	98	396	116
Apr. 10.7	28.324	21.60	33.205	57.23	36.698	6.16	43.770	34.41
20.7	28.627 ³⁰³	23.19 ¹⁵⁹	33.487 ²⁸²	56.68 ⁵⁵	36.986 ²⁸⁸	7.61 ¹⁴⁵	44.132 ³⁶²	36.13 ¹⁷²
30.6	28.909 ²⁸²	25.23 ²⁰⁴	33.756 ²⁶⁹	55.96 ⁷²	37.253 ²⁶⁷	9.47 ¹⁸⁶	44.464 ³³²	38.36 ²²³
May 10.6	29.162 ²⁵³	27.64 ²⁴¹	34.005 ²⁴⁹	55.14 ⁸²	37.498 ²⁴⁵	11.69 ²²²	44.756 ²⁹²	41.01 ²⁶⁵
20.6	29.382 ²²⁰	30.36 ²⁷²	34.233 ²²⁸	54.25 ⁸⁹	37.713 ²¹⁵	14.18 ²⁴⁹	45.003 ²⁴⁷	44.00 ²⁹⁹
	184	291	201	93	183	267	196	320
30.6	29.566	33.27	34.434	53.32	37.896	16.85	45.199	47.20
June 9.5	29.707 ¹⁴¹	36.31 ³⁰⁴	34.604 ¹⁷⁰	52.39 ⁹³	38.041 ¹⁴⁵	19.63 ²⁷⁸	45.339 ¹⁴⁰	50.54 ³³⁴
19.5	29.804 ⁹⁷	39.35 ³⁰⁴	34.741 ¹³⁷	51.49 ⁹⁰	38.146 ¹⁰⁵	22.43 ²⁸⁰	45.422 ⁸³	53.91 ³³⁷
29.5	29.854 ⁵⁰	42.36 ³⁰¹	34.839 ⁹⁸	50.64 ⁸⁵	38.209 ⁶³	25.17 ²⁷⁴	45.445 ²³	57.24 ³³³
July 9.4	29.855 ¹	45.23 ²⁸⁷	34.897 ⁵⁸	49.85 ⁷⁹	38.227 ¹⁸	27.80 ²⁶³	45.407 ³⁸	60.41 ³¹⁷
	46	266	17	68	26	244	98	297
19.4	29.809	47.89	34.914	49.17	38.201	30.24	45.309	63.38
29.4	29.717 ⁹²	50.30 ²⁴¹	34.889 ²⁵	48.57 ⁶⁰	38.132 ⁶⁹	32.43 ²¹⁹	45.156 ¹⁵³	66.06 ²⁶⁸
Aug. 8.4	29.582 ¹³⁵	52.40 ²¹⁰	34.825 ⁶⁴	48.06 ⁵¹	38.021 ¹¹¹	34.35 ¹⁹²	44.950 ²⁰⁶	68.41 ²³⁵
18.3	29.407 ¹⁷⁵	54.14 ¹⁷⁴	34.727 ⁹⁸	47.64 ⁴²	37.876 ¹⁴⁶	35.94 ¹⁵⁹	44.697 ²⁵³	70.35 ¹⁹⁴
28.3	29.200 ²⁰⁷	55.49 ¹³⁵	34.597 ¹³⁰	47.31 ³³	37.698 ¹⁷⁸	37.18 ¹²⁴	44.406 ²⁹¹	71.87 ¹⁵²
	231	95	154	24	202	87	320	106
Sept. 7.3	28.969	56.44	34.443	47.07	37.496	38.05	44.086	72.92
17.3	28.721 ²⁴⁸	56.95 ⁵¹	34.273 ¹⁷⁰	46.90 ¹⁷	37.278 ²¹⁸	38.53 ⁴⁸	43.746 ³⁴⁰	73.48 ⁵⁶
27.2	28.466 ²⁵⁵	57.00 ⁵	34.097 ¹⁷⁶	46.80 ¹⁰	37.054 ²²⁴	38.59 ⁶	43.398 ³⁴⁸	73.54 ⁶
Oct. 7.2	28.215 ²⁵¹	56.60 ⁴⁰	33.924 ¹⁷³	46.79 ¹	36.833 ²²¹	38.25 ³⁴	43.054 ³⁴⁴	73.07 ⁴⁷
17.2	27.978 ²³⁷	55.74 ⁸⁶	33.766 ¹⁵⁸	46.85 ⁶	36.626 ²⁰⁷	37.50 ⁷⁵	42.726 ³²⁸	72.11 ⁹⁶
	211	131	136	16	184	116	299	146
27.1	27.767	54.43	33.630	47.01	36.442	36.34	42.427	70.65
Nov. 6.1	27.589 ¹⁷⁸	52.71 ¹⁷²	33.527 ¹⁰³	47.28 ²⁷	36.290 ¹⁵²	34.80 ¹⁵⁴	42.168 ²⁵⁹	68.71 ¹⁹⁴
16.1	27.454 ¹³⁵	50.58 ²¹³	33.464 ⁶³	47.64 ³⁶	36.179 ¹¹¹	32.90 ¹⁹⁰	41.959 ²⁰⁹	66.34 ²³⁷
26.1	27.368 ⁸⁶	48.10 ²⁴⁸	33.444 ²⁰	48.12 ⁴⁸	36.113 ⁶⁶	30.68 ²²²	41.808 ¹⁵¹	63.58 ²⁷⁶
Dec. 6.0	27.334 ³⁴	45.35 ²⁷⁵	33.471 ²⁷	48.71 ⁵⁹	36.096 ¹⁷	28.19 ²⁴⁹	41.723 ⁸⁵	60.51 ³⁰⁷
	21	297	74	71	34	269	19	330
16.0	27.355	42.38	33.545	49.42	36.130	25.50	41.704	57.21
26.0	27.431 ⁷⁶	39.28 ³¹⁰	33.665 ¹²⁰	50.21 ⁷⁹	36.216 ⁸⁶	22.69 ²⁸¹	41.756 ⁵²	53.78 ³⁴³
36.0	27.561 ¹³⁰	36.17 ³¹¹	33.827 ¹⁶²	51.06 ⁸⁵	36.349 ¹³³	19.85 ²⁸⁴	41.876 ¹²⁰	50.34 ³⁴⁴
Mean Place	26.434	38.34	30.696	52.53	34.709	21.40	42.110	52.87
Sec δ , Tan δ	1.257	+0.761	1.015	-0.172	1.146	+0.560	1.606	+1.257
$D_{\psi} a$, $D_{\omega} a$	+0.04	0.00	+0.07	0.00	+0.05	0.00	+0.03	0.00
$D_{\psi} \delta$, $D_{\omega} \delta$	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	67 Ophiuchi. Mag. 3.9		θ Arae. Mag. 3.9		γ Sagittarii. Mag. 3.1		70 Ophiuchi. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 56 s	° ' " + 2 55 "	h m 18 0 s	° ' " -50 5 "	h m 18 0 s	° ' " -30 25 "	h m 18 1 s	° ' " + 2 30 "
Jan. 1.0	32.028	62.85	14.393	52.89	32.140	33.98	18.312	61.55
10.9	32.204 176	61.27 158	14.660 267	51.33 156	32.352 212	33.59 39	18.483 171	59.98 157
20.9	32.412 208	59.74 153	14.980 320	49.93 140	32.602 250	33.26 33	18.689 206	58.45 153
30.9	32.648 236	58.32 142	15.343 363	48.72 121	32.883 281	33.02 24	18.922 233	57.04 141
Feb. 9.9	32.906 258	57.09 123	15.741 398	47.70 102	33.189 306	32.82 20	19.178 256	55.80 124
	274	100	423	80	323	15	271	99
19.8	33.180	56.09 70	16.164	46.90 59	33.512	32.67 11	19.449	54.81 73
Mar. 1.8	33.464 284	55.39 39	16.605 441	46.31 39	33.848 336	32.56 10	19.732 283	54.08 40
11.8	33.754 290	55.00 6	17.056 451	45.92 16	34.190 342	32.46 9	20.022 290	53.68 9
21.8	34.046 292	54.94 29	17.510 454	45.76 5	34.535 345	32.37 8	20.314 292	53.59 26
31.7	34.336 290	55.23 61	17.961 451	45.81 25	34.878 343	32.29 7	20.605 291	53.85 57
	284		442		337		286	
Apr. 10.7	34.620	55.84 88	18.403	46.06 44	35.215	32.22 4	20.891	54.42 86
20.7	34.893 273	56.72 115	18.830 427	46.50 64	35.542 327	32.18 2	21.167 276	55.27 111
30.6	35.153 260	57.87 135	19.236 406	47.14 82	35.853 311	32.16 3	21.428 261	56.38 131
May 10.6	35.394 241	59.22 148	19.615 379	47.96 99	36.146 293	32.19 8	21.673 245	57.69 146
20.6	35.613 219	60.70 159	19.959 344	48.95 116	36.413 267	32.27 15	21.895 222	59.15 154
	191		303		239		197	
30.6	35.804	62.29 162	20.262	50.11 128	36.652	32.42 23	22.092	60.69 159
June 9.5	35.965 161	63.91 162	20.518 256	51.39 138	36.855 203	32.65 28	22.258 166	62.28 158
19.5	36.092 127	65.53 156	20.720 202	52.77 145	37.019 164	32.93 35	22.390 132	63.86 152
29.5	36.182 90	67.09 147	20.864 144	54.22 148	37.141 122	33.28 39	22.485 95	65.38 144
July 9.5	36.233 51	68.56 136	20.948 84	55.70 145	37.216 75	33.67 43	22.541 56	66.82 130
	10		21		28		15	
19.4	36.243 30	69.92 119	20.969 43	57.15 138	37.244 20	34.10 44	22.556 26	68.12 117
29.4	36.213 69	71.11 105	20.926 102	58.53 124	37.224 67	34.54 41	22.530 64	69.29 100
Aug. 8.4	36.144 103	72.16 86	20.824 157	59.77 108	37.157 108	34.95 37	22.466 98	70.29 83
18.3	36.041 133	73.02 68	20.667 204	60.85 85	37.049 143	35.32 29	22.368 130	71.12 65
28.3	35.908 157	73.70 49	20.463 241	61.70 58	36.906 172	35.61 18	22.238 154	71.77 46
Sept. 7.3	35.751	74.19 28	20.222	62.28 28	36.734	35.79 7	22.084	72.23 27
17.3	35.581 170	74.47 10	19.955 267	62.56 4	36.542 192	35.86 6	21.913 171	72.50 8
27.2	35.402 179	74.57 10	19.678 277	62.52 38	36.343 199	35.80 20	21.736 177	72.58 13
Oct. 7.2	35.227 175	74.47 33	19.404 255	62.14 71	36.146 183	35.60 33	21.561 175	72.45 32
17.2	35.065 140	74.14 51	19.149 220	61.43 100	35.963 156	35.27 44	21.398 163	72.13 52
27.2	34.925 109	73.63 73	18.929 174	60.43 127	35.807 119	34.83 53	21.256 110	71.61 73
Nov. 6.1	34.816 72	72.90 93	18.755 116	59.16 147	35.688 76	34.30 59	21.146 74	70.88 93
16.1	34.744 29	71.97 112	18.639 50	57.69 164	35.612 26	33.71 63	21.072 33	69.95 111
26.1	34.715 17	70.85 129	18.589 19	56.05 173	35.586 27	33.08 61	21.039 13	68.84 128
Dec. 6.0	34.732 63	69.56 143	18.608 92	54.32 176	35.613 81	32.47 59	21.052 59	67.56 144
16.0	34.795	68.13 153	18.700	52.57 171	35.694	31.88 52	21.111	66.12 153
26.0	34.902 107	66.60 158	18.860 160	50.86 162	35.827 133	31.36 46	21.214 103	64.59 157
36.0	35.050 148	65.02	19.085 225	49.24	36.007 180	30.90	21.359 145	63.02
Mean Place	32.307	64.34	14.836	54.82	32.334	34.71	18.591	62.86
Sec δ, Tan δ	1.001	+0.051	1.559	-1.196	1.160	-0.587	1.001	+0.044
Dψ a, Dω a	+0.06	0.00	+0.09	0.00	+0.08	0.00	+0.06	0.00
Dψ δ, Dω δ	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Time.	Groombridge 2533. Mag. 5.4		36 Draconis. Mag. 5.0		δ Sagittarii. Mag. 2.8		γ Serpentis. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 13 s	° ' +42 7 "	h m 18 13 s	° ' +64 21 "	h m 18 15 s	° ' -29 51 "	h m 18 17 s	° ' - 2 55 "
n. 1.0	4.554	48.75	22.48	67.54	44.459	50.52	3.704	16.24
11.0	4.690 ¹³⁶	45.56 ³¹⁹	22.61 ¹⁸	64.04 ³⁵⁰	44.654 ¹⁹⁵	50.06 ⁴⁶	3.863 ¹⁵⁹	17.44 ¹²⁰
20.9	4.878 ¹⁸⁸	42.50 ³⁰⁶	22.83 ²²	60.67 ³³⁷	44.886 ²³²	49.67 ³⁹	4.057 ¹⁹⁴	18.61 ¹¹⁷
30.9	5.111 ²³³	39.69 ²⁸¹	23.14 ⁸¹	57.58 ³⁰⁹	45.152 ²⁶⁶	49.33 ³⁴	4.280 ²²³	19.71 ¹¹⁰
b. 9.9	5.383 ²⁷²	37.23 ²⁴⁶	23.54 ⁴⁰	54.87 ²⁷¹	45.444 ²⁹²	49.04 ²⁹	4.526 ²⁴⁶	20.67 ⁹⁶
	303	200	45	223	314	26	264	76
19.8	5.686	35.23	23.99	52.64	45.758	48.78	4.790	21.43
ar. 1.8	6.012 ³²⁶	33.75 ¹⁴⁸	24.48 ⁴⁹	50.99 ¹⁶⁵	46.084 ³²⁶	48.54 ²⁴	5.069 ²⁷⁹	21.98 ⁵⁵
11.8	6.354 ³⁴²	32.87 ⁸⁸	25.01 ⁵³	49.98 ¹⁰¹	46.420 ³³⁶	48.31 ²³	5.355 ²⁸⁶	22.26 ²⁸
21.8	6.706 ³⁵²	32.59 ²⁸	25.56 ⁵⁵	49.63 ³⁵	46.761 ³⁴¹	48.08 ²³	5.647 ²⁹²	22.27 ¹
31.7	7.056 ³⁵⁰	32.92 ³³	26.11 ⁵⁵	49.95 ³²	47.103 ³⁴²	47.86 ²²	5.939 ²⁹²	21.99 ²⁸
	344	95	54	98	338	22	290	54
pr. 10.7	7.400	33.87	26.65	50.93	47.441	47.64	6.229	21.45
20.7	7.730 ³³⁰	35.36 ¹⁴⁹	27.15 ⁵⁰	52.51 ¹⁵⁸	47.772 ³³¹	47.45 ¹⁹	6.512 ²⁸³	20.67 ⁷⁸
30.7	8.038 ³⁰⁸	37.36 ²⁰⁰	27.61 ⁴⁶	54.64 ²¹³	48.090 ³¹⁸	47.28 ¹⁷	6.784 ²⁷²	19.68 ⁹⁹
ay 10.6	8.319 ²⁸¹	39.78 ²⁴²	28.02 ⁴¹	57.24 ²⁶⁰	48.389 ²⁹⁹	47.16 ¹²	7.040 ²⁶⁶	18.52 ¹¹⁶
20.6	8.566 ²⁴⁷	42.53 ²⁷⁵	28.35 ³³	60.22 ²⁹⁸	48.668 ²⁷⁹	47.11 ⁵	7.277 ²³⁷	17.26 ¹²⁶
	208	300	27	325	250	1	212	134
30.6	8.774	45.53	28.62	63.47	48.918	47.12	7.489	15.92
ne 9.5	8.938 ¹⁶⁴	48.69 ³¹⁶	28.81 ¹⁹	66.90 ³⁴³	49.135 ²¹⁷	47.22 ¹⁰	7.672 ¹⁸³	14.56 ¹³⁶
19.5	9.054 ¹¹⁶	51.91 ³²²	28.91 ¹⁰	70.43 ³⁵³	49.314 ¹⁷⁹	47.41 ¹⁹	7.821 ¹⁴⁹	13.21 ¹³⁵
29.5	9.120 ⁶⁶	55.11 ³²⁰	28.93 ²	73.92 ³⁴⁹	49.450 ¹³⁶	47.68 ²⁷	7.933 ¹¹²	11.92 ¹²⁹
ly 9.5	9.135 ¹⁵	58.20 ³⁰⁹	28.86 ⁷	77.32 ³⁴⁰	49.540 ⁹⁰	48.02 ⁸⁴	8.005 ⁷²	10.73 ¹¹⁹
	38	292	17	321	44	38	31	109
19.4	9.097	61.12	28.69	80.53	49.584	48.40	8.036	9.64
29.4	9.008 ⁸⁹	63.78 ²⁶⁶	28.46 ²³	83.48 ²⁹⁵	49.579 ⁵	48.82 ⁴²	8.025 ¹¹	8.67 ⁹⁷
ig. 8.4	8.871 ¹³⁷	66.15 ²³⁷	28.15 ³¹	86.10 ²⁶²	49.527 ⁵²	49.24 ⁴²	7.974 ⁵¹	7.84 ⁸³
18.4	8.691 ¹⁸⁰	68.16 ²⁰¹	27.77 ³⁸	88.35 ²²⁵	49.432 ⁹⁵	49.63 ³⁹	7.886 ⁸⁸	7.17 ⁶⁷
28.3	8.473 ²¹⁸	69.78 ¹⁶²	27.33 ⁴⁴	90.17 ¹⁸²	49.298 ¹³⁴	49.97 ³⁴	7.765 ¹²¹	6.64 ⁵³
	247	120	48	134	165	24	148	38
pt. 7.3	8.226	70.98	26.85	91.51	49.133	50.21	7.617	6.26
17.3	7.958 ²⁶⁸	71.73 ⁷⁵	26.34 ⁵¹	92.37 ⁸⁶	48.947 ¹⁸⁶	50.36 ¹⁵	7.451 ¹⁶⁶	6.03 ²³
27.2	7.680 ²⁷⁸	72.00 ²⁷	25.81 ⁵³	92.70 ³³	48.749 ¹⁹⁸	50.39 ³	7.275 ¹⁷⁶	5.93 ¹⁰
st. 7.2	7.402 ²⁷⁸	71.80 ²⁰	25.29 ⁵²	92.50 ²⁰	48.551 ¹⁹⁸	50.29 ¹⁰	7.098 ¹⁷⁷	5.98 ⁵
17.2	7.134 ²⁶⁸	71.12 ⁶⁸	24.77 ⁵²	91.77 ⁷³	48.364 ¹⁸⁷	50.05 ²⁴	6.933 ¹⁶⁵	6.19 ²¹
	245	116	48	126	162	35	147	35
27.2	6.889	69.96	24.29	90.51	48.202	49.70	6.786	6.54
iv. 6.1	6.676 ²¹³	68.34 ¹⁶²	23.85 ⁴⁴	88.74 ¹⁷⁷	48.072 ¹³⁰	49.25 ⁴⁵	6.666 ¹²⁰	7.03 ⁴⁹
16.1	6.504 ¹⁷²	66.30 ²⁰⁴	23.47 ³⁸	86.49 ²²⁵	47.984 ⁸⁸	48.72 ⁵³	6.584 ⁸²	7.69 ⁶⁶
26.1	6.381 ¹²³	63.87 ²⁴³	23.17 ³⁰	83.82 ²⁶⁷	47.944 ⁴⁰	48.14 ⁵⁸	6.541 ⁴³	8.49 ⁸⁰
xc. 6.1	6.310 ⁷¹	61.12 ²⁷⁵	22.96 ²¹	80.79 ³⁰³	47.955 ¹¹	47.55 ⁵⁹	6.543 ²	9.42 ⁹³
	13	301	12	330	64	57	46	107
16.0	6.297	58.11	22.84	77.49	48.019	46.98	6.589	10.49
26.0	6.343 ⁴⁶	54.95 ³¹⁶	22.81 ³	74.00 ³⁴⁹	48.135 ¹¹⁶	46.44 ⁵⁴	6.680 ⁹¹	11.64 ¹¹⁵
36.0	6.444 ¹⁰¹	51.73 ³²²	22.88 ⁷	70.48 ³⁵²	48.298 ¹⁶³	45.95 ⁴⁹	6.813 ¹³³	12.84 ¹²⁰
Place	5.714	50.67	25.496	69.50	44.663	51.00	3.950	15.65
l, Tan δ	1.348	+0.905	2.312	+2.084	1.153	-0.574	1.001	-0.051
D _α α	+0.04	0.00	+0.01	-0.01	+0.08	0.00	+0.06	0.00
D _α δ	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	λ Sagittarii. Mag. 2.9		c Serpentis. Mag. 5.4		1 Aquilæ. Mag. 4.1		ζ Pavonis. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 22 s " s	° ' " -25 28 " " "	h m 18 25 s " s	° ' " - 2 2 " " "	h m 18 30 s " s	° ' " - 8 17 " " "	h m 18 33 s " s	° ' " -71 29 " " "
n. 1.0	54.420	5.60	24.660	21.99	44.464	68.84	25.64	60.19
11.0	54.600 180	5.39 21	24.811 151	23.20 121	44.616 152	69.67 83	25.99 35	57.41 278
20.9	54.818 218	5.22 17	24.998 187	24.38 118	44.803 187	70.48 81	26.46 47	54.77 264
30.9	55.068 250	5.08 14	25.214 216	25.47 109	45.021 218	71.23 75	27.04 58	52.34 243
b. 9.9	55.343 275	4.94 14	25.454 240	26.42 95	45.263 242	71.88 65	27.71 67	50.18 216
	296	14	260	77	262	51	73	186
19.9	55.639	4.80	25.714	27.19	45.525	72.39	28.44	48.32
r. 1.8	55.950 311	4.63 17	25.990 276	27.72 53	45.802 277	72.71 32	29.24 80	46.81 151
11.8	56.270 320	4.43 20	26.275 285	27.98 26	46.090 288	72.84 13	30.07 83	45.66 115
21.8	56.596 326	4.17 26	26.565 290	27.96 2	46.385 295	72.74 10	30.92 85	44.89 77
31.7	56.925 329	3.88 29	26.859 294	27.65 31	46.682 297	72.41 33	31.79 87	44.51 38
	326	32	291	59	297	54	86	1
r. 10.7	57.251	3.56	27.150	27.06	46.979	71.87	32.65	44.50
20.7	57.571 320	3.21 35	27.436 286	26.23 83	47.272 293	71.14 73	33.49 84	44.89 39
30.7	57.879 308	2.85 36	27.711 275	25.17 106	47.555 283	70.25 89	34.30 81	45.65 76
y 10.6	58.174 295	2.51 34	27.973 262	23.95 122	47.825 270	69.23 102	35.05 75	46.76 111
20.6	58.447 273	2.21 30	28.215 242	22.59 136	48.076 251	68.13 110	35.74 69	48.19 143
	246	24	219	143	229	113	61	175
30.6	58.693	1.97	28.434	21.16	48.305	67.00	36.35	49.94
ne 9.6	58.908 215	1.79 18	28.624 190	19.72 144	48.504 199	65.86 114	36.87 52	51.94 200
19.5	59.088 180	1.69 10	28.782 158	18.27 145	48.671 167	64.75 111	37.29 42	54.14 220
29.5	59.228 140	1.68 1	28.901 119	16.89 138	48.800 129	63.71 104	37.59 30	56.49 235
ly 9.5	59.324 96	1.76 8	28.982 81	15.61 128	48.890 90	62.76 95	37.77 18	58.92 243
	48	13	38	117	48	84	6	244
19.4	59.372	1.89	29.020	14.44	48.938	61.92	37.83	61.36
29.4	59.374 2	2.08 19	29.018 2	13.40 104	48.943 5	61.20 72	37.75 8	63.73 237
lg. 8.4	59.331 43	2.31 23	28.974 44	12.50 90	48.906 37	60.59 61	37.55 20	65.95 222
18.4	59.244 87	2.54 23	28.892 82	11.75 75	48.829 77	60.10 49	37.24 31	67.93 198
28.3	59.120 124	2.76 22	28.775 117	11.16 59	48.717 112	59.73 37	36.83 41	69.61 168
	155	18	144	43	139	25	49	130
pt. 7.3	58.965	2.94	28.631	10.73	48.578	59.48	36.34	70.91
17.3	58.788 177	3.06 12	28.467 164	10.45 28	48.416 162	59.32 16	35.78 56	71.79 88
27.3	58.599 189	3.11 5	28.293 174	10.33 12	48.243 173	59.26 6	35.18 60	72.18 39
t. 7.2	58.409 190	3.07 4	28.117 176	10.35 2	48.087 176	59.29 3	34.57 61	72.07 11
17.2	58.228 181	2.95 12	27.950 167	10.54 19	47.900 167	59.41 12	33.98 59	71.45 62
	159	21	150	34	151	22	55	112
27.2	58.069	2.74	27.800	10.88	47.749	59.63	33.43	70.33
v. 6.1	57.941 128	2.47 27	27.679 121	11.38 50	47.626 123	59.94 31	32.96 47	68.74 159
16.1	57.851 90	2.16 31	27.591 88	12.04 66	47.536 90	60.35 41	32.58 38	66.74 200
26.1	57.806 45	1.82 34	27.544 47	12.84 80	47.486 50	60.86 51	32.31 27	64.41 233
c. 6.1	57.811 5	1.49 33	27.538 6	13.79 95	47.480 6	61.47 61	32.18 13	61.81 260
	55	31	39	107	39	72	0	276
16.0	57.866	1.18	27.577	14.86	47.519	62.19	32.18	59.05
26.0	57.969 103	0.90 28	27.660 83	16.02 116	47.602 83	62.96 77	32.31 13	56.21 284
36.0	58.119 150	0.68 22	27.786 126	17.23 121	47.728 126	63.77 81	32.57 26	53.38 283
Place	54.614	5.84	24.916	21.60	44.684	68.69	27.453	61.45
, Tan δ	1.108	-0.476	1.001	-0.036	1.011	-0.146	3.151	-2.988
, D _α	+0.07	0.00	+0.06	0.00	+0.06	0.00	+0.14	+0.03
, D _δ	0.0	-1.0	0.0	-1.0	+0.1	-1.0	+0.1	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Time.	6 Aquilæ. Mag. 4.5		λ Pavonis. Mag. 4.4		β Lyrae. Var. 3.4-4.1		50 Draconis. Mag. 5.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 42 s	° ' " - 4 49 "	h m 18 44 s	° ' " -62 16 "	h m 18 47 s	° ' " +33 15 "	h m 18 48 s	° ' " +75 19 "
n. 1.0	49.174	71.79	36.39	58.72	2.292	61.07	55.64	77.71
11.0	49.311 137	72.78 99	36.63 24	56.29 243	2.395 103	58.20 287	55.64 0	74.27 344
21.0	49.484 173	73.74 96	36.96 33	53.96 233	2.543 148	55.40 280	55.80 16	70.87 340
30.9	49.688 204	74.64 90	37.36 40	51.80 216	2.731 188	52.78 262	56.14 34	67.63 324
b. 9.9	49.917 229	75.40 76	37.81 45	49.82 198	2.956 225	50.42 236	56.62 48	64.69 294
	252	60	50	173	256	199	61	254
19.9	50.169	76.00	38.31	48.09	3.212	48.43	57.23	62.15
1r. 1.8	50.436 267	76.40 40	38.86 55	46.61 148	3.492 280	46.90 153	57.95 72	60.11 204
11.8	50.716 280	76.55 15	39.43 57	45.43 118	3.794 302	45.89 101	58.75 80	58.66 145
21.8	51.004 288	76.46 9	40.02 59	44.54 89	4.107 313	45.43 46	59.63 88	57.83 83
31.8	51.298 294	76.09 37	40.63 61	43.98 56	4.429 322	45.54 11	60.52 89	57.66 17
	295	62	60	25	322	67	88	50
pr. 10.7	51.593	75.47	41.23	43.73	4.751	46.21	61.40	58.16
20.7	51.885 292	74.64 83	41.82 59	43.81 8	5.069 318	47.42 121	62.25 85	59.29 113
30.7	52.170 285	73.62 102	42.40 58	44.20 39	5.374 305	49.11 169	63.04 79	61.00 171
ay 10.7	52.443 273	72.43 119	42.95 55	44.91 71	5.663 289	51.22 211	63.76 72	63.24 224
20.6	52.698 255	71.14 129	43.46 51	45.91 100	5.927 264	53.68 246	64.38 62	65.91 267
	234	135	46	128	235	272	49	304
30.6	52.932	69.79	43.92	47.19	6.162	56.40	64.87	68.95
me 9.6	53.138 206	68.42 137	44.32 40	48.73 154	6.361 199	59.31 291	65.22 35	72.24 329
19.5	53.312 174	67.08 134	44.65 33	50.47 174	6.519 158	62.32 301	65.44 22	75.69 345
29.5	53.451 139	65.80 128	44.91 26	52.37 190	6.634 115	65.34 302	65.51 7	79.23 354
ily 9.5	53.549 98	64.62 118	45.07 16	54.38 201	6.702 68	68.30 296	65.43 8	82.74 351
	56	107	9	206	20	284	22	342
19.5	53.605	63.55	45.16	56.43	6.722	71.14	65.21	86.16
29.4	53.618 13	62.60 95	45.15 1	58.47 204	6.693 29	73.78 264	64.83 38	89.39 323
ug. 8.4	53.588 30	61.80 80	45.06 9	60.42 195	6.617 76	76.18 240	64.34 49	92.36 297
18.4	53.519 69	61.15 65	44.89 17	62.20 178	6.498 119	78.28 210	63.71 63	95.02 266
28.4	53.414 105	60.64 51	44.64 25	63.74 154	6.340 158	80.04 176	62.98 73	97.30 228
	134	37	31	124	190	140	81	188
pt. 7.3	53.280	60.27	44.33	64.98	6.150	81.44	62.17	99.18
17.3	53.122 158	60.04 23	43.96 37	65.86 88	5.935 215	82.44 100	61.29 88	100.59 141
27.3	52.951 171	59.94 10	43.57 39	66.35 49	5.705 230	83.02 58	60.37 92	101.50 91
ct. 7.2	52.776 175	59.96 2	43.17 40	66.40 5	5.468 237	83.17 15	59.43 94	101.90 40
17.2	52.608 168	60.10 14	42.78 39	66.01 39	5.236 232	82.88 29	58.48 95	101.77 13
	155	28	36	83	216	73	92	68
27.2	52.453	60.38	42.42	65.18	5.020	82.15	57.56	101.09
iv. 6.2	52.323 130	60.78 40	42.11 31	63.92 126	4.826 194	80.99 116	56.70 86	99.88 121
16.1	52.224 99	61.30 52	41.85 26	62.31 161	4.666 160	79.42 157	55.91 79	98.16 172
26.1	52.165 59	61.95 65	41.68 17	60.38 193	4.546 120	77.47 195	55.23 68	95.96 220
xc. 6.1	52.148 17	62.71 76	41.59 9	58.20 218	4.470 76	75.19 228	54.68 55	93.32 264
	26	86	0	233	28	256	43	299
16.1	52.174	63.57	41.59	55.87	4.442	72.63	54.25	90.33
26.0	52.243 69	64.51 94	41.68 9	53.43 244	4.463 21	69.88 275	53.98 27	87.09 324
36.0	52.353 110	65.50 99	41.88 20	50.98 245	4.534 71	67.03 285	53.90 8	83.67 342
Place	49.414	71.87	37.352	59.19	3.133	60.19	61.662	75.42
δ, Tan δ	1.004	-0.085	2.150	-1.903	1.196	+0.656	3.951	+3.822
, D _α α	+0.06	0.00	+0.11	+0.02	+0.04	-0.01	-0.04	-0.05
, D _α δ	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Draconis. Mag. 4.8		♐ Sagittarii. Mag. 2.1		♏ Serpentis pr. Mag. 4.5		R Lyrae. Var. 4.0-4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 49 s	° ' +59 16 "	h m 18 50 s	° ' -26 23 "	h m 18 52 s	° ' + 4 5 "	h m 18 52 s	° ' +43 48 "
Jan. 1.0	57.275	78.03	10.630	59.36	8.255	45.78	49.180	76.53
11.0	57.340 ⁶⁵	74.58 ³⁴⁵	10.781 ¹⁵¹	58.98 ³⁸	8.377 ¹²²	44.30 ¹⁴⁸	49.265 ⁸⁵	73.36 ³¹⁷
21.0	57.484 ¹⁴⁴	71.19 ³³⁹	10.972 ¹⁹¹	58.62 ³⁶	8.534 ¹⁵⁷	42.86 ¹⁴⁴	49.403 ¹³⁸	70.24 ³¹²
30.9	57.702 ²¹⁸	67.97 ³²²	11.197 ²²⁵	58.26 ³⁶	8.722 ¹⁸⁸	41.51 ¹³⁵	49.592 ¹⁸⁹	67.30 ²⁹⁴
Feb. 9.9	57.990 ²⁸⁸	65.06 ²⁹¹	11.451 ²⁵⁴	57.90 ³⁶	8.938 ²¹⁶	40.34 ¹¹⁷	49.825 ²³³	64.65 ²⁶⁵
	347	249	278	38	239	96	273	227
19.9	58.337	62.57	11.729	57.52	9.177	39.38	50.098	62.38
Mar. 1.8	58.735 ³⁹⁸	60.59 ¹⁹⁸	12.027 ²⁹⁸	57.11 ⁴¹	9.435 ²⁵⁸	38.70 ⁶⁸	50.403 ³⁰⁵	60.59 ¹⁷⁹
11.8	59.171 ⁴³⁶	59.21 ¹³⁸	12.338 ³¹¹	56.66 ⁴⁵	9.706 ²⁷¹	38.34 ³⁶	50.733 ³³⁰	59.36 ¹²³
21.8	59.632 ⁴⁶¹	58.45 ⁷⁶	12.660 ³²²	56.17 ⁴⁹	9.989 ²⁸³	38.31 ³	51.082 ³⁴⁹	58.72 ⁶⁴
31.8	60.107 ⁴⁷⁵	58.35 ¹⁰	12.988 ³²⁸	55.65 ⁵²	10.278 ²⁸⁹	38.63 ³²	51.440 ³⁵⁸	58.72 ⁰
	477	58	331	55	292	66	360	60
Apr. 10.7	60.584	58.93	13.319	55.10	10.570	39.29	51.800	59.32
20.7	61.048 ⁴⁶⁴	60.13 ¹²⁰	13.649 ³³⁰	54.53 ⁵⁷	10.860 ²⁹⁰	40.25 ⁹⁶	52.154 ³⁵⁴	60.51 ¹¹⁹
30.7	61.487 ⁴³⁹	61.91 ¹⁷⁸	13.972 ³²³	53.99 ⁵⁴	11.144 ²⁸⁴	41.49 ¹²⁴	52.495 ³⁴¹	62.24 ¹⁷³
May 10.7	61.891 ⁴⁰⁴	64.20 ²²⁹	14.282 ³¹⁰	53.48 ⁵¹	11.417 ²⁷³	42.96 ¹⁴⁷	52.815 ³²⁰	64.45 ²²¹
20.6	62.249 ³⁵⁸	66.94 ²⁷⁴	14.576 ²⁹⁴	53.03 ⁴⁵	11.672 ²⁵⁵	44.60 ¹⁶⁴	53.105 ²⁹⁰	67.06 ²⁶¹
	303	308	271	37	235	176	255	291
30.6	62.552	70.02	14.847	52.66	11.907	46.36	53.360	69.97
June 9.6	62.792 ²⁴⁰	73.35 ³³³	15.088 ²⁴¹	52.39 ²⁷	12.114 ²⁰⁷	48.18 ¹⁸²	53.572 ²¹²	73.12 ³¹⁵
19.5	62.964 ¹⁷²	76.84 ³⁴⁹	15.294 ²⁰⁶	52.23 ¹⁶	12.289 ¹⁷⁵	50.01 ¹⁸³	53.739 ¹⁶⁷	76.40 ³²⁸
29.5	63.062 ⁹⁸	80.39 ³⁵⁵	15.461 ¹⁶⁷	52.17 ⁶	12.430 ¹⁴¹	51.80 ¹⁷⁹	53.853 ¹¹⁴	79.72 ³³²
July 9.5	63.086 ²⁴	83.90 ³⁵¹	15.583 ¹²²	52.22 ⁵	12.529 ⁹⁹	53.50 ¹⁷⁰	53.914 ⁶¹	83.01 ³²⁹
	52	340	76	15	58	157	6	316
19.5	63.034	87.30	15.659	52.37	12.587	55.07	53.920	86.17
29.4	62.909 ¹²⁵	90.52 ³²²	15.686 ²⁷	52.61 ²⁴	12.602 ¹⁵	56.51 ¹⁴⁴	53.870 ⁵⁰	89.15 ²⁹⁸
Aug. 8.4	62.713 ¹⁹⁶	93.47 ²⁹⁵	15.665 ²¹	52.90 ²⁹	12.574 ²⁸	57.77 ¹²⁶	53.768 ¹⁰²	91.87 ²⁷²
18.4	62.453 ²⁶⁰	96.09 ²⁶²	15.599 ⁶⁶	53.24 ³⁴	12.506 ⁶⁸	58.83 ¹⁰⁶	53.617 ¹⁵¹	94.28 ²⁴¹
28.4	62.137 ³¹⁶	98.33 ²²⁴	15.492 ¹⁰⁷	53.58 ³⁴	12.402 ¹⁰⁴	59.70 ⁸⁷	53.422 ¹⁹⁵	96.33 ²⁰⁵
	365	182	142	31	133	65	230	165
Sept. 7.3	61.772	100.15	15.350	53.89	12.269	60.35	53.192	97.98
17.3	61.372 ⁴⁰⁰	101.50 ¹³⁵	15.181 ¹⁶⁹	54.14 ²⁵	12.111 ¹⁵⁸	60.81 ⁴⁶	52.931 ²⁶¹	99.22 ¹²⁴
27.3	60.947 ⁴²⁵	102.35 ⁸⁵	14.994 ¹⁸⁷	54.33 ¹⁹	11.938 ¹⁷³	61.04 ²³	52.653 ²⁷⁸	99.96 ⁷⁴
Oct. 7.2	60.512 ⁴³⁵	102.69 ³⁴	14.802 ¹⁹²	54.42 ⁹	11.761 ¹⁷⁷	61.07 ³	52.367 ²⁹⁶	100.24 ²⁸
17.2	60.080 ⁴³²	102.48 ²¹	14.615 ¹⁸⁷	54.42 ⁰	11.587 ¹⁷⁴	60.88 ¹⁹	52.083 ²⁸⁴	100.02 ²²
	415	74	170	10	159	39	269	70
27.2	59.665	101.74	14.445	54.32	11.428	60.49	51.814	99.32
Nov. 6.2	59.281 ³⁸⁴	100.47 ¹²⁷	14.299 ¹⁴⁶	54.13 ¹⁹	11.289 ¹³⁹	59.88 ⁶¹	51.570 ²⁴⁴	98.12 ¹²⁰
16.1	58.942 ³³⁹	98.68 ¹⁷⁹	14.190 ¹⁰⁹	53.84 ²⁹	11.182 ¹⁰⁷	59.08 ⁸⁰	51.361 ²⁰⁹	96.46 ¹⁶⁶
26.1	58.659 ²⁸³	96.42 ²²⁶	14.122 ⁶⁸	53.52 ³²	11.111 ⁷¹	58.09 ⁹⁹	51.194 ¹⁶⁷	94.37 ²⁰⁹
Dec. 6.1	58.440 ²¹⁹	93.75 ²⁶⁷	14.101 ²¹	53.15 ³⁷	11.080 ³¹	56.91 ¹¹⁸	51.075 ¹¹⁹	91.88 ²⁴⁹
	146	303	26	39	11	131	65	278
16.1	58.294	90.72	14.127	52.76	11.091	55.60	51.010	89.10
26.0	58.226 ⁶⁸	87.45 ³²⁷	14.202 ⁷⁵	52.38 ³⁸	11.144 ⁵³	54.18 ¹⁴²	51.001 ⁹	86.07 ³⁰³
36.0	58.240 ¹⁴	84.04 ³⁴¹	14.323 ¹²¹	52.00 ³⁸	11.237 ⁹³	52.70 ¹⁴⁸	51.050 ⁴⁹	82.93 ³¹⁴
Mean Place	59.618	76.11	10.834	59.38	8.564	45.31	50.414	74.85
Sec δ, Tan δ	1.958	+1.683	1.116	-0.496	1.003	+0.072	1.386	+0.960
D _μ α, D _ω α	+0.02	-0.02	+0.07	+0.01	+0.06	0.00	+0.04	-0.01
D _μ δ, D _ω δ	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Time.	γ Lyrae. Mag. 3.3		ϵ Aquilae. Mag. 4.2		ζ Sagittarii. Mag. 2.7		ζ Aquilae. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 55 s 18 55 " s	° ' " +32 34 " s	h m 18 55 s 18 55 " s	° ' " +14 57 " s	h m 18 57 s 18 57 " s	° ' " -29 59 " s	h m 19 1 s 19 1 " s	° ' " +13 44 " s
a. 1.0	51.728	36.12	53.585	22.43	23.484	55.42	38.038	27.55
11.0	51.821 93	33.30 282	53.695 110	20.38 205	23.632 148	54.79 63	38.142 104	25.56 199
21.0	51.959 138	30.53 277	53.840 145	18.37 201	23.820 188	54.17 62	38.283 141	23.62 194
30.9	52.138 179	27.93 260	54.020 180	16.49 188	24.045 225	53.56 61	38.459 176	21.80 182
b. 9.9	52.354 216	25.57 236	54.231 211	14.82 167	24.301 256	52.96 60	38.664 205	20.19 161
	247	200	234	140	280	60	230	136
19.9	52.601	23.57 156	54.465	13.42 104	24.581	52.36 60	38.894	18.83 101
ur. 1.8	52.874 273	22.01 105	54.720 255	12.38 65	24.883 302	51.76 60	39.146 252	17.82 63
11.8	53.169 295	20.96 51	54.992 272	11.73 23	25.201 318	51.16 61	39.414 268	17.19 21
21.8	53.479 310	20.45 7	55.275 283	11.50 22	25.530 329	50.55 61	39.695 281	16.98 21
31.8	53.797 318	20.52 61	55.566 291	11.72 64	25.867 337	49.94 58	39.985 290	17.19 64
	322		295		342		294	
ur. 10.7	54.119	21.13 114	55.861	12.36 105	26.209	49.36 57	40.279	17.83 104
20.7	54.438 319	22.27 164	56.154 293	13.41 142	26.549 340	48.79 52	40.573 294	18.87 139
30.7	54.746 308	23.91 206	56.440 286	14.83 173	26.884 335	48.27 46	40.861 288	20.26 170
ly 10.7	55.039 293	25.97 240	56.714 274	16.56 198	27.208 324	47.81 36	41.138 277	21.96 194
20.6	55.309 270	28.37 269	56.970 256	18.54 217	27.514 306	47.45 25	41.398 260	23.90 213
	242		235		284		239	
30.6	55.551	31.06 288	57.205	20.71 229	27.798	47.20 14	41.637	26.03 225
ne 9.6	55.758 207	33.94 299	57.410 205	23.00 233	28.052 254	47.06 1	41.848 211	28.28 229
19.5	55.926 168	36.93 301	57.583 173	25.33 233	28.271 219	47.05 12	42.026 178	30.57 228
29.5	56.051 125	39.94 297	57.718 135	27.66 225	28.450 179	47.17 25	42.168 142	32.85 221
ly 9.5	56.129 78	42.91 285	57.813 95	29.91 213	28.583 133	47.42 34	42.269 101	35.06 208
	31		52		86		58	
19.5	56.160	45.76 267	57.865	32.04 197	28.669	47.76 43	42.327	37.14 194
29.4	56.142 18	48.43 243	57.873 35	34.01 176	28.704 35	48.19 48	42.341 14	39.08 172
ig. 8.4	56.077 65	50.86 214	57.838 77	35.77 152	28.689 15	48.67 52	42.312 29	40.80 151
18.4	55.967 110	53.00 183	57.761 112	37.29 127	28.627 62	49.19 50	42.242 70	42.31 125
28.4	55.817 150	54.83 145	57.649 143	38.56 100	28.521 106	49.69 45	42.135 107	43.56 99
	182				143		139	
pt. 7.3	55.635	56.28 107	57.506	39.56 70	28.378	50.14 38	41.996	44.55 70
17.3	55.426 209	57.35 65	57.338 168	40.26 41	28.206 172	50.52 28	41.833 163	45.25 42
27.3	55.201 225	58.00 23	57.155 183	40.67 10	28.016 190	50.80 15	41.653 180	45.67 13
st. 7.2	54.969 232	58.23 20	56.965 190	40.77 21	27.817 199	50.95 2	41.467 186	45.80 18
17.2	54.739 230	58.03 64	56.779 186	40.56 50	27.622 195	50.97 13	41.282 185	45.62 46
	216		173		181		172	
27.2	54.523	57.39 107	56.606	40.06 82	27.441	50.84 25	41.110	45.16 77
iv. 6.2	54.329 194	56.32 148	56.454 152	39.24 111	27.287 154	50.59 38	40.958 152	44.39 105
16.1	54.166 163	54.84 186	56.332 122	38.13 136	27.167 120	50.21 48	40.836 122	43.34 130
26.1	54.041 125	52.98 220	56.245 87	36.77 162	27.090 77	49.73 55	40.746 90	42.04 154
xc. 6.1	53.959 82	50.78 248	56.198 47	35.15 181	27.059 31	49.18 59	40.697 49	40.50 174
	35		4		19		7	
16.1	53.924	48.30 269	56.194	33.34 196	27.078	48.59 62	40.690	38.76 188
26.0	53.938 14	45.61 281	56.233 39	31.38 205	27.147 69	47.97 63	40.725 35	36.88 197
36.0	53.999 61	42.80	56.314	29.33	27.262 115	47.34	40.801 76	34.91
a Place	52.541	34.57	54.023	21.49	23.701	55.32	38.455	26.35
), Tan δ	1.187	+0.639	1.035	+0.267	1.155	-0.577	1.029	+0.245
, D α α	+0.04	-0.01	+0.05	0.00	+0.08	+0.01	+0.05	0.00
, D α δ	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Aquilæ. Mag. 3.6			α Coronæ Australis. Mag. 4.1			ϵ Lyræ. Mag. 5.1			π Sagittarii. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 19 1	s	° ' "	h m 19 3	s	° ' "	h m 19 4	s	° ' "	h m 19 4	s	° ' "
Jan. 1.0	53.601		22.45	53.359		61.29	21.654		17.48	53.092		18.04
11.0	53.719	118	23.37 92	53.510	151	60.14 115	21.734	80	14.58 290	53.221	129	17.94 10
21.0	53.874	155	24.27 90	53.706	196	59.01 113	21.861	127	11.70 288	53.389	168	17.84 10
30.9	54.060	186	25.09 82	53.941	235	57.91 110	22.031	170	8.97 273	53.591	202	17.71 13
Feb. 9.9	54.274	214	25.79 70	54.213	272	56.85 106	22.241	210	6.50 247	53.821	230	17.53 18
		237	" 54		301	" 101		245	" 212		257	" 24
19.9	54.511		26.33	54.514		55.84	22.486		4.38	54.078		17.29
Mar. 1.9	54.768	257	26.65 32	54.837	323	54.90 94	22.760	274	2.70 168	54.353	275	16.98 31
11.8	55.039	271	26.75 10	55.181	344	54.01 89	23.058	298	1.52 118	54.644	291	16.57 41
21.8	55.322	283	26.59 16	55.539	358	53.20 81	23.372	314	0.90 62	54.949	305	16.07 50
31.8	55.613	291	26.18 41	55.906	367	52.48 72	23.698	326	0.87 3	55.262	313	15.47 60
		295	" 67		373	" 64		331	" 53		318	" 67
Apr. 10.7	55.908		25.51	56.279		51.84	24.029		1.40	55.580		14.80
20.7	56.204	296	24.62 89	56.652	373	51.32 52	24.358	329	2.49 109	55.898	318	14.05 75
30.7	56.496	292	23.54 108	57.019	367	50.92 40	24.678	320	4.09 160	56.213	315	13.28 77
May 10.7	56.778	282	22.30 124	57.375	356	50.67 25	24.982	304	6.15 206	56.518	305	12.50 76
20.6	57.046	268	20.96 134	57.713	338	50.57 10	25.265	283	8.59 244	56.810	292	11.74 76
		247	" 140		313	" 6		252	" 273		271	" 70
30.6	57.293		19.56	58.026		50.63	25.517		11.32	57.081		11.04
June 9.6	57.514	221	18.14 142	58.309	283	50.87 24	25.735	218	14.27 296	57.324	243	10.40 64
19.6	57.705	191	16.75 139	58.552	243	51.26 39	25.912	177	17.36 309	57.535	211	9.87 53
29.5	57.860	155	15.42 133	58.751	199	51.82 56	26.045	133	20.49 313	57.708	173	9.45 42
July 9.5	57.975	115	14.19 123	58.901	150	52.52 70	26.130	85	23.58 309	57.840	132	9.14 31
		73	" 110		97	" 80		35	" 299		87	" 17
19.5	58.048		13.09	58.998		53.32	26.165		26.57	57.927		8.97
29.4	58.077	29	12.11 98	59.040	42	54.19 87	26.150	15	29.39 282	57.966	39	8.90 7
Aug. 8.4	58.063	14	11.28 83	59.027	13	55.10 91	26.085	65	31.98 259	57.960	6	8.92 2
18.4	58.008	55	10.62 66	58.961	66	56.02 92	25.974	111	34.28 230	57.908	52	9.02 10
28.4	57.916	92	10.09 53	58.848	113	56.87 85	25.821	153	36.25 197	57.816	92	9.17 15
		125	" 37		154	" 74		188	" 161		128	" 19
Sept. 7.3	57.791		9.72	58.694		57.61	25.633		37.86	57.688		9.36
17.3	57.641	150	9.48 24	58.505	189	58.22 61	25.417	216	39.06 120	57.531	157	9.55 19
27.3	57.474	167	9.38 10	58.295	210	58.66 44	25.182	235	39.84 78	57.357	174	9.72 17
Oct. 7.3	57.300	174	9.40 2	58.075	220	58.88 22	24.938	244	40.19 35	57.174	183	9.87 15
17.2	57.129	171	9.54 14	57.857	218	58.89 1	24.695	243	40.10 9	56.994	180	9.96 9
		158	" 27		202	" 22		231	" 55		167	" 5
27.2	56.971		9.81	57.655		58.67	24.464		39.55	56.827		10.01
Nov. 6.2	56.833	138	10.19 38	57.479	176	58.24 43	24.254	210	38.54 101	56.681	146	10.01 0
16.1	56.726	107	10.69 50	57.338	141	57.60 64	24.074	180	37.09 145	56.567	114	9.97 4
26.1	56.653	73	11.30 61	57.243	95	56.80 80	23.931	143	35.24 185	56.492	75	9.91 6
Dec. 6.1	56.620	33	12.03 73	57.200	43	55.86 94	23.831	100	33.01 223	56.459	33	9.83 3
		9	" 81		9	" 104		51	" 253		11	" 9
16.1	56.629		12.84	57.209		54.82	23.780		30.48	56.470		9.74
26.0	56.681	52	13.73 89	57.271	62	53.72 110	23.778	2	27.72 276	56.527	57	9.65 9
36.0	56.771	90	14.65 92	57.387	116	52.59 113	23.825	47	24.82 290	56.628	101	9.57 8
Mean Place	53.834		22.94	53.640		60.94	22.561		15.12	53.281		18.05
Sec δ , Tan δ	1.004		-0.088	1.270		-0.782	1.236		+0.726	1.072		-0.387
$D\psi a$, $D\omega a$	+0.06		0.00	+0.08		+0.01	+0.04		-0.01	+0.07		+0.01
$D\psi \delta$, $D\omega \delta$	+0.1		-1.0	+0.1		-1.0	+0.1		-1.0	+0.1		-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Aquilæ. Mag. 5.1		κ Cygni. Mag. 4.0		τ Draconis. Mag. 4.6		δ Aquilæ. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 13	° ' +11 26	h m 19 15	° ' +53 12	h m 19 17	° ' +73 11	h m 19 21	° ' + 2 56
	s	"	s	"	s	"	s	"
Jan. 1.0	57.677	49.52	10.772	64.34	3.39	78.53	21.570	62.69
11.0	57.770 ⁹³	47.71 ¹⁸¹	10.808 ³⁶	61.04 ³³⁰	3.32 ⁷	75.15 ³³⁸	21.663 ⁹³	61.36 ¹³³
21.0	57.901 ¹³¹	45.92 ¹⁷⁹	10.912 ¹⁰⁴	57.74 ³³⁰	3.39 ⁷	71.72 ³⁴³	21.794 ¹³¹	60.06 ¹³⁰
30.9	58.066 ¹⁶⁵	44.24 ¹⁶⁸	11.078 ¹⁶⁶	54.56 ³¹⁸	3.60 ²¹	68.39 ³³³	21.957 ¹⁶³	58.85 ¹²¹
Feb. 9.9	58.260 ¹⁹⁴	42.73 ¹⁵¹	11.304 ²²⁶	51.63 ²⁹³	3.96 ³⁶	65.29 ³¹⁰	22.148 ¹⁹¹	57.79 ¹⁰⁶
	221	124	279	257	47	276	218	86
19.9	58.481	41.49	11.583	49.06	4.43	62.53	22.366	56.93
Mar. 1.9	58.724 ²⁴³	40.54 ⁹⁵	11.908 ³²⁵	46.95 ²¹¹	5.01 ⁵⁸	60.22 ²³¹	22.605 ²³⁹	56.33 ⁶⁰
11.8	58.986 ²⁶²	39.97 ⁵⁷	12.272 ³⁶⁴	45.38 ¹⁵⁷	5.68 ⁶⁷	58.45 ¹⁷⁷	22.863 ²⁵⁸	56.03 ³⁰
21.8	59.261 ²⁷⁵	39.79 ¹⁸	12.665 ³⁹³	44.44 ⁹⁴	6.41 ⁷³	57.29 ¹¹⁶	23.135 ²⁷²	56.04 ¹
31.8	59.548 ²⁸⁷	40.01 ²²	13.075 ⁴¹⁰	44.12 ³²	7.19 ⁷⁸	56.78 ⁵¹	23.419 ²⁸⁴	56.40 ³⁶
	292	63	419	32	79	14	291	68
Apr. 10.8	59.840	40.64	13.494	44.44	7.98	56.92	23.710	57.08
20.7	60.134 ²⁹⁴	41.65 ¹⁰¹	13.912 ⁴¹⁸	45.41 ⁹⁷	8.77 ⁷⁹	57.71 ⁷⁹	24.005 ²⁹⁵	58.05 ⁹⁷
30.7	60.426 ²⁹²	42.99 ¹³⁴	14.316 ⁴⁰⁴	46.95 ¹⁵⁴	9.50 ⁷³	59.13 ¹⁴²	24.298 ²⁹³	59.30 ¹²⁵
May 10.7	60.708 ²⁸²	44.64 ¹⁶⁵	14.698 ³⁸²	49.03 ²⁰⁸	10.20 ⁷⁰	61.09 ¹⁹⁶	24.584 ²⁸⁶	60.77 ¹⁴⁷
20.6	60.976 ²⁶⁸	46.52 ¹⁸⁸	15.047 ³⁴⁹	51.57 ²⁵⁴	10.81 ⁶¹	63.55 ²⁴⁶	24.858 ²⁷⁴	62.43 ¹⁶⁶
	247	206	308	291	52	285	254	176
30.6	61.223	48.58	15.355	54.48	11.33	66.40	25.112	64.19
June 9.6	61.444 ²²¹	50.74 ²¹⁶	15.615 ²⁶⁰	57.68 ³²⁰	11.74 ⁴¹	69.59 ³¹⁹	25.343 ²³¹	66.02 ¹⁸³
19.6	61.634 ¹⁹⁰	52.96 ²²²	15.819 ²⁰⁴	61.07 ³³⁹	12.03 ²⁹	73.00 ³⁴¹	25.544 ²⁰¹	67.87 ¹⁸⁵
29.5	61.788 ¹⁵⁴	55.16 ²²⁰	15.962 ¹⁴³	64.58 ³⁵¹	12.20 ¹⁷	76.56 ³⁵⁶	25.710 ¹⁶⁶	69.68 ¹⁸¹
July 9.5	61.902 ¹¹⁴	57.29 ²¹³	16.042 ⁸⁰	68.08 ³⁵⁰	12.23 ³	80.15 ³⁵⁹	25.837 ¹²⁷	71.40 ¹⁷²
	72	202	15	345	9	355	86	160
19.5	61.974	59.31	16.057	71.53	12.14	83.70	25.923	73.00
29.5	62.002 ²⁸	61.18 ¹⁸⁷	16.005 ⁵²	74.83 ³³⁰	11.91 ²³	87.13 ³⁴³	25.965 ⁴²	74.46 ¹⁴⁶
Aug. 8.4	61.986 ¹⁶	62.86 ¹⁶⁸	15.890 ¹¹⁵	77.90 ³⁰⁷	11.57 ³⁴	90.37 ³²⁴	25.964 ¹	75.75 ¹²⁹
18.4	61.928 ⁵⁸	64.31 ¹⁴⁵	15.716 ¹⁷⁴	80.69 ²⁷⁹	11.12 ⁴⁵	93.33 ²⁹⁶	25.920 ⁴⁴	76.84 ¹⁰⁹
28.4	61.833 ⁹⁵	65.53 ¹²²	15.487 ²²⁹	83.13 ²⁴⁴	10.56 ⁵⁶	95.96 ²⁶³	25.838 ⁸²	77.74 ⁹⁰
	128	98	275	205	66	225	117	68
Sept. 7.3	61.705	66.51	15.212	85.18	9.90	98.21	25.721	78.42
17.3	61.549 ¹⁵⁶	67.21 ⁷⁰	14.901 ³¹¹	86.79 ¹⁶¹	9.19 ⁷¹	100.03 ¹⁸²	25.578 ¹⁴³	78.92 ⁵⁰
27.3	61.377 ¹⁷²	67.65 ⁴⁴	14.563 ³³⁸	87.93 ¹¹⁴	8.42 ⁷⁷	101.38 ¹³⁵	25.416 ¹⁶²	79.20 ²⁸
Oct. 7.3	61.195 ¹⁸²	67.81 ¹⁶	14.209 ³⁵⁴	88.57 ⁶⁴	7.61 ⁸¹	102.22 ⁸⁴	25.243 ¹⁷³	79.29 ⁹
17.2	61.014 ¹⁸¹	67.69 ¹²	13.853 ³⁵⁶	88.69 ¹²	6.80 ⁸¹	102.52 ³⁰	25.071 ¹⁷²	79.17 ¹²
	170	39	345	41	80	24	164	31
27.2	60.844	67.30	13.508	88.28	6.00	102.28	24.907	78.86
Nov. 6.2	60.691 ¹⁵³	66.64 ⁶⁶	13.183 ³²⁵	87.33 ⁹⁵	5.23 ⁷⁷	101.48 ⁸⁰	24.761 ¹⁴⁶	78.36 ⁵⁰
16.2	60.566 ¹²⁵	65.72 ⁹²	12.892 ²⁹¹	85.88 ¹⁴⁵	4.51 ⁷²	100.14 ¹³⁴	24.641 ¹²⁰	77.66 ⁷⁰
26.1	60.472 ⁹⁴	64.54 ¹¹⁸	12.645 ²⁴⁷	83.94 ¹⁹⁴	3.88 ⁶³	98.28 ¹⁸⁶	24.552 ⁸⁹	76.80 ⁸⁶
Dec. 6.1	60.417 ⁵⁵	63.15 ¹³⁹	12.449 ¹⁹⁶	81.55 ²³⁹	3.34 ⁵⁴	95.94 ²³⁴	24.500 ⁵²	75.78 ¹⁰²
	16	159	136	275	43	275	12	117
16.1	60.401	61.56	12.313	78.80	2.91	93.19	24.488	74.61
26.0	60.427 ²⁶	59.84 ¹⁷²	12.239 ⁷⁴	75.74 ³⁰⁶	2.61 ³⁰	90.11 ³⁰⁸	24.516 ²⁸	73.34 ¹²⁷
36.0	60.494 ⁶⁷	58.04 ¹⁸⁰	12.233 ⁶	72.50 ³²⁴	2.45 ¹⁶	86.80 ³³¹	24.584 ⁶⁸	72.02 ¹³²
Mean Place	58.052	47.86	12.518	60.09	8.400	73.10	21.844	61.26
Sec δ, Tan δ	1.020	+0.202	1.670	+1.338	3.461	+3.313	1.001	+0.052
D _α , D _ω α	+0.06	0.00	+0.03	-0.03	-0.02	-0.07	+0.06	0.00
D _ψ δ, D _ω δ	+0.1	-0.9	+0.1	-0.9	+0.1	-0.9	+0.1	-0.9

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FOR THE UPPER TRANSIT AT WASHINGTON.

hington n Time.	β Cygni. Mag. 3.2		γ Cygni. Mag. 3.9		μ Aquilæ. Mag. 4.6		h Sagittarii. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 27	° ' +27 47	h m 19 27	° ' +51 33	h m 19 30	° ' + 7 12	h m 19 31	° ' -25 3
	s "	"	s "	"	s "	"	s "	"
l. 1.0	24.201	15.43	36.754	21.88	4.740	16.69	42.936	56.73
11.0	24.266 ⁶⁵	12.89 ²⁵⁴	36.776 ²²	18.66 ³²²	4.822 ⁸²	15.15 ¹⁵⁴	43.041 ¹⁰⁵	56.32 ⁴¹
21.0	24.372 ¹⁰⁶	10.36 ²⁵³	36.861 ⁸⁵	15.40 ³²⁶	4.941 ¹¹⁹	13.63 ¹⁵²	43.184 ¹⁴³	55.87 ⁴⁵
31.0	24.518 ¹⁴⁶	7.93 ²⁴³	37.008 ¹⁴⁷	12.25 ³¹⁵	5.094 ¹⁵³	12.20 ¹⁴³	43.364 ¹⁸⁰	55.39 ⁴⁸
b. 9.9	24.699 ¹⁸¹	5.71 ²²²	37.213 ²⁰⁵	9.30 ²⁹⁵	5.275 ¹⁸¹	10.92 ¹²⁸	43.576 ²¹²	54.86 ⁵³
	215	194	256	260	209	105	239	59
19.9	24.914	3.77 ¹⁵⁴	37.469	6.70 ²¹⁷	5.484	9.87 ⁷⁷	43.815	54.27
r. 1.9	25.156 ²⁴²	2.23 ¹¹⁰	37.773 ³⁰⁴	4.53 ¹⁶⁵	5.716 ²³²	9.10 ⁴⁵	44.078 ²⁶³	53.62 ⁶⁵
11.8	25.424 ²⁶⁸	1.13 ⁶⁰	38.115 ³⁴²	2.88 ¹⁰⁵	5.969 ²⁵³	8.65 ¹⁰	44.362 ²⁸⁴	52.89 ⁷³
21.8	25.710 ²⁸⁶	0.53 ⁷	38.487 ³⁷²	1.83 ⁴²	6.237 ²⁶⁸	8.55 ²⁷	44.663 ³⁰¹	52.11 ⁷⁸
31.8	26.013 ³⁰³	0.46 ⁴⁵	38.882 ³⁹⁵	1.41 ²¹	6.519 ²⁸²	8.82 ⁶³	44.977 ³¹⁴	51.28 ⁸³
	310		406		290		323	89
r. 10.8	26.323	0.91 ⁹⁷	39.288	1.62 ⁸³	6.809	9.45 ⁹⁷	45.900	50.39
20.7	26.636 ³¹³	1.88 ¹⁴³	39.695 ⁴⁰⁷	2.45 ¹⁴⁴	7.103 ²⁹⁴	10.42 ¹²⁹	45.629 ³²⁹	49.49 ⁹⁰
30.7	26.947 ³¹¹	3.31 ¹⁸⁴	40.094 ³⁹⁹	3.89 ¹⁹⁷	7.397 ²⁹⁴	11.71 ¹⁵⁶	45.958 ³²⁹	48.59 ⁹⁰
y 10.7	27.248 ³⁰¹	5.15 ²²²	40.475 ³⁸¹	5.86 ²⁴⁴	7.685 ²⁸⁸	13.27 ¹⁷⁶	46.282 ³²⁴	47.73 ⁸⁶
20.7	27.534 ²⁸⁶	7.37 ²⁵⁰	40.827 ³⁵²	8.30 ²⁸³	7.962 ²⁷⁷	15.03 ¹⁹²	46.595 ³¹³	46.93 ⁸⁰
	262		316		258		295	70
30.6	27.796	9.87 ²⁷⁰	41.143	11.13 ³¹³	8.220	16.95 ²⁰¹	46.890	46.23
ne 9.6	28.031 ²³⁵	12.57 ²⁸³	41.414 ²⁷¹	14.26 ³³⁵	8.455 ²³⁵	18.96 ²⁰⁵	47.160 ²⁷⁰	45.63 ⁶⁰
19.6	28.231 ²⁰⁰	15.40 ²⁸⁹	41.633 ²¹⁹	17.61 ³⁴⁷	8.660 ²⁰⁵	21.01 ¹⁹⁶	47.401 ²⁴¹	45.17 ⁴⁶
29.5	28.391 ¹⁶⁰	18.29 ²⁸⁷	41.795 ¹⁶²	21.08 ³⁵¹	8.831 ¹⁷¹	23.05 ¹⁸⁵	47.604 ²⁰³	44.85 ³²
ly 9.5	28.507 ¹¹⁶	21.16 ²⁷⁸	41.896 ¹⁰¹	24.59 ³⁴⁶	8.963 ¹³²	25.01 ¹⁷¹	47.766 ¹⁶²	44.70 ¹⁵
	71		37		92		116	2
19.5	28.578	23.94 ²⁶³	41.933	28.05 ³³³	9.055 ⁴⁷	26.86 ¹⁷¹	47.882 ⁶⁷	44.68 ¹²
29.5	28.600 ²⁴	26.57 ²⁴⁴	41.907 ⁸⁹	31.38 ³¹³	9.102 ³	28.57 ¹⁵¹	47.949 ¹⁸	44.80 ²⁴
ig. 8.4	28.576 ⁷⁰	29.01 ²¹⁸	41.818 ¹⁴⁸	34.51 ²⁸⁶	9.105 ⁴⁰	30.08 ¹³²	47.967 ²⁹	45.04 ³²
18.4	28.506 ¹¹¹	31.19 ¹⁹⁰	41.670 ²⁰²	37.37 ²⁵³	9.065 ⁷⁹	31.40 ¹⁰⁹	47.938 ⁷⁵	45.36 ³⁸
28.4	28.395 ¹⁴⁷	33.09 ¹⁵⁷	41.468 ²⁴⁹	39.90 ²¹⁶	8.986 ¹¹⁴	32.49 ⁸⁷	47.863 ¹¹⁴	45.74 ⁴¹
pt. 7.4	28.248	34.66 ¹²²	41.219	42.06 ¹⁷³	8.872	33.36 ⁶³	47.749	46.15
17.3	28.071 ¹⁷⁷	35.88 ⁸⁵	40.933 ²⁸⁶	43.79 ¹²⁸	8.731 ¹⁴¹	33.99 ⁴⁰	47.603 ¹⁴⁶	46.55 ⁴⁰
27.3	27.874 ¹⁹⁷	36.73 ⁴⁶	40.618 ³¹⁵	45.07 ⁷⁸	8.569 ¹⁶²	34.39 ¹⁶	47.433 ¹⁷⁰	46.91 ³⁶
t. 7.3	27.663 ²¹¹	37.19 ⁶	40.286 ³³²	45.85 ²⁷	8.396 ¹⁷³	34.55 ⁸	47.249 ¹⁸⁴	47.21 ³⁰
17.2	27.452 ²¹¹	37.25 ³⁴	39.949 ³³⁷	46.12 ²⁵	8.220 ¹⁷⁶	34.47 ³²	47.063 ¹⁸⁶	47.42 ²¹
	205		331		168		178	13
27.2	27.247	36.91 ⁷⁵	39.618	45.87 ⁷⁸	8.052	34.15 ⁵⁴	46.885	47.55
rv. 6.2	27.058 ¹⁸⁹	36.16 ¹¹⁵	39.306 ³¹²	45.09 ¹³⁰	7.901 ¹⁵¹	33.61 ⁷⁷	46.726 ¹⁵⁹	47.57 ²
16.2	26.895 ¹⁶³	35.01 ¹⁵¹	39.023 ²⁸³	43.79 ¹⁷⁹	7.774 ¹²⁷	32.84 ⁹⁷	46.594 ¹³²	47.49 ⁸
26.1	26.764 ¹³¹	33.50 ¹⁸⁴	38.779 ²⁴⁴	42.00 ²²⁴	7.676 ⁹⁸	31.87 ¹¹⁸	46.496 ⁹⁸	47.34 ¹⁵
xc. 6.1	26.670 ⁹⁴	31.66 ²¹³	38.583 ¹⁹⁶	39.76 ²⁶⁴	7.615 ⁶¹	30.69 ¹³³	46.439 ⁵⁷	47.09 ²⁵
	53		140		23		14	29
16.1	26.617	29.53	38.443	37.12	7.592	29.36	46.425	46.80
26.1	26.608 ⁹	27.18 ²³⁵	38.361 ⁸²	34.18 ²⁹⁴	7.609 ¹⁷	27.91 ¹⁴⁵	46.456 ³¹	46.46 ³⁴
36.0	26.642 ³⁴	24.68 ²⁵⁰	38.342 ¹⁹	31.03 ³¹⁵	7.664 ⁵⁵	26.37 ¹⁵⁴	46.531 ⁷⁵	46.09 ³⁷
a Place	24.845	11.85	38.349	16.52	5.045	14.63	43.112	56.41
b, Tan δ	1.130	+0.527	1.608	+1.260	1.008	+0.126	1.104	-0.468
, D α	+0.05	-0.01	+0.03	-0.03	+0.06	0.00	+0.07	+0.01
, D δ	+0.1	-0.9	+0.1	-0.9	+0.2	-0.9	+0.2	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	κ Aquilæ. Mag. 5.0		θ Cygni. Mag. 4.6		ϵ Sagittarii. Mag. 5.4		β Sagittæ. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 32 s	° ' " - 7 12 "	h m 19 34 s	° ' " +50 1 "	h m 19 36 s	° ' " -16 28 "	h m 19 37 s	° ' " +17 16 "
Jan. 1.0	28.675	37.31	13.095	56.19	1.442	55.94	21.514	70.18
11.0	28.765 ⁹⁰	38.00 ⁶⁹	13.112 ¹⁷	53.03 ³¹⁶	1.535 ⁹³	56.05 ¹¹	21.579 ⁶⁵	68.15 ²⁰³
21.0	28.892 ¹²⁷	38.67 ⁶⁷	13.189 ⁷⁷	49.82 ³²¹	1.667 ¹³²	56.13 ⁸	21.683 ¹⁰⁴	66.12 ²⁰³
31.0	29.052 ¹⁶⁰	39.26 ⁵⁹	13.326 ¹³⁷	46.68 ³¹⁴	1.832 ¹⁶⁵	56.15 ²	21.822 ¹³⁹	64.18 ¹⁹⁴
Feb. 9.9	29.240 ¹⁸⁸	39.74 ⁴⁸	13.518 ¹⁹²	43.76 ²⁹²	2.027 ¹⁹⁵	56.09 ⁶	21.995 ¹⁷³	62.41 ¹⁷⁷
	215	33	243	260	222	16	202	151
19.9	29.455	40.07	13.761	41.16	2.249	55.93	22.197	60.90
Mar. 1.9	29.692 ²³⁷	40.21 ¹⁴	14.051 ²⁹⁰	38.99 ²¹⁷	2.494 ²⁴⁵	55.63 ³⁰	22.424 ²²⁷	59.72 ¹¹⁸
11.8	29.949 ²⁵⁷	40.14 ⁷	14.378 ³²⁷	37.32 ¹⁶⁷	2.760 ²⁶⁶	55.20 ⁴³	22.675 ²⁵¹	58.92 ⁸⁰
21.8	30.221 ²⁷²	39.83 ³¹	14.737 ³⁵⁹	36.23 ¹⁰⁹	3.041 ²⁸¹	54.63 ⁵⁷	22.944 ²⁶⁹	58.54 ³⁸
31.8	30.506 ²⁸⁵	39.30 ⁵³	15.118 ³⁸¹	35.77 ⁴⁶	3.336 ²⁹⁵	53.91 ⁷²	23.227 ²⁸³	58.61 ⁷
	294	77	395	16	306	85	294	52
Apr. 10.8	30.800	38.53	15.513	35.93	3.642	53.06	23.521	59.13
20.7	31.099 ²⁹⁹	37.56 ⁹⁷	15.911 ³⁹⁸	36.71 ⁷⁸	3.953 ³¹¹	52.10 ⁹⁶	23.821 ³⁰⁰	60.07 ⁹⁴
30.7	31.398 ²⁹⁹	36.41 ¹¹⁵	16.302 ³⁹¹	38.10 ¹³⁹	4.265 ³¹²	51.05 ¹⁰⁵	24.120 ²⁹⁹	61.42 ¹³⁵
May 10.7	31.693 ²⁹⁵	35.13 ¹²⁸	16.679 ³⁷⁷	40.01 ¹⁹¹	4.572 ³⁰⁷	49.96 ¹⁰⁹	24.414 ²⁹⁴	63.12 ¹⁷⁰
20.7	31.978 ²⁸⁵	33.76 ¹³⁷	17.029 ³⁵⁰	42.40 ²³⁹	4.870 ²⁹⁸	48.86 ¹¹⁰	24.696 ²⁸²	65.10 ¹⁹⁸
	268	142	316	278	281	108	262	223
30.6	32.246	32.34	17.345	45.18	5.151	47.78	24.958	67.33
June 9.6	32.491 ²⁴⁵	30.92 ¹⁴²	17.620 ²⁷⁵	48.28 ³¹⁰	5.410 ²⁵⁹	46.76 ¹⁰²	25.197 ²³⁹	69.71 ²³⁸
19.6	32.708 ²¹⁷	29.53 ¹³⁹	17.845 ²²⁵	51.60 ⁸³²	5.641 ²³¹	45.83 ⁹³	25.405 ²⁰⁸	72.18 ²⁴⁷
29.5	32.892 ¹⁸⁴	28.22 ¹³¹	18.016 ¹⁷¹	55.04 ³⁴⁴	5.836 ¹⁹⁵	45.01 ⁸²	25.577 ¹⁷²	74.68 ²⁵⁰
July 9.5	33.038 ¹⁴⁶	27.03 ¹¹⁹	18.128 ¹¹²	58.53 ³⁴⁹	5.992 ¹⁵⁶	44.34 ⁶⁷	25.710 ¹³³	77.14 ²⁴⁶
	103	107	51	346	113	54	90	237
19.5	33.141	25.96	18.179	61.99	6.105	43.80	25.800	79.51
29.5	33.200 ⁵⁹	25.04 ⁹²	18.166 ¹³	65.33 ³³⁴	6.173 ⁶⁸	43.41 ³⁹	25.844 ⁴⁴	81.73 ²²²
Aug. 8.4	33.213 ¹³	24.28 ⁷⁶	18.093 ⁷³	68.46 ³¹³	6.194 ²¹	43.17 ²⁴	25.844 ⁰	83.76 ²⁰³
18.4	33.184 ²⁹	23.67 ⁶¹	17.962 ¹³¹	71.35 ²⁸⁹	6.169 ²⁵	43.04 ¹³	25.801 ⁴³	85.57 ¹⁸¹
28.4	33.113 ⁷¹	23.21 ⁴⁶	17.778 ¹⁸⁴	73.92 ²⁵⁷	6.102 ⁶⁷	43.02 ²	25.716 ⁸⁵	87.12 ¹⁵⁵
	106	31	232	220	105	8	121	127
Sept. 7.4	33.007	22.90	17.546	76.12	5.997	43.10	25.595	88.39
17.3	32.872 ¹³⁵	22.73 ¹⁷	17.277 ²⁶⁹	77.90 ¹⁷⁸	5.861 ¹³⁶	43.24 ¹⁴	25.446 ¹⁴⁹	89.38 ⁹⁹
27.3	32.717 ¹⁵⁵	22.68 ⁵	16.978 ²⁹⁹	79.24 ¹³⁴	5.702 ¹⁵⁹	43.41 ¹⁷	25.275 ¹⁷¹	90.05 ⁶⁷
Oct. 7.3	32.548 ¹⁶⁹	22.73 ⁵	16.663 ³¹⁵	80.09 ⁸⁵	5.531 ¹⁷¹	43.61 ²⁰	25.091 ¹⁸⁴	90.40 ³⁵
17.2	32.377 ¹⁷¹	22.88 ¹⁵	16.340 ³²³	80.44 ³⁵	5.356 ¹⁷⁵	43.82 ²¹	24.904 ¹⁸⁷	90.44 ⁴
	162	26	317	18	167	20	182	29
27.2	32.215	23.14	16.023	80.26	5.189	44.02	24.722	90.15
Nov. 6.2	32.068 ¹⁴⁷	23.48 ³⁴	15.723 ³⁰⁰	79.57 ⁶⁹	5.037 ¹⁵²	44.21 ¹⁹	24.556 ¹⁶⁶	89.55 ⁶⁰
16.2	31.946 ¹²²	23.89 ⁴¹	15.449 ²⁷⁴	78.36 ¹²¹	4.912 ¹²⁵	44.39 ¹⁸	24.412 ¹⁴⁴	88.64 ⁹¹
26.1	31.854 ⁹²	24.39 ⁵⁰	15.212 ²³⁷	76.65 ¹⁷¹	4.817 ⁹⁵	44.56 ¹⁷	24.298 ¹¹⁴	87.42 ¹²²
Dec. 6.1	31.800 ⁵⁴	24.96 ⁵⁷	15.021 ¹⁹¹	74.49 ²¹⁶	4.760 ⁵⁷	44.73 ¹⁷	24.218 ⁸⁰	85.95 ¹⁴⁷
	15	64	139	255	16	16	41	172
16.1	31.785	25.60	14.882	71.94	4.744	44.89	24.177	84.23
26.1	31.809 ²⁴	26.28 ⁶⁸	14.799 ⁸³	69.07 ²⁸⁷	4.769 ²⁵	45.04 ¹⁵	24.175 ²	82.34 ¹⁸⁶
36.0	31.873 ⁶⁴	27.00 ⁷²	14.776 ²³	65.97 ³¹⁰	4.835 ⁶⁶	45.19 ¹⁵	24.213 ³⁸	80.33 ²⁰¹
Mean Place	28.867	38.27	14.572	50.32	1.605	56.21	21.937	66.90
Sec δ , Tan δ	1.008	-0.126	1.557	+1.193	1.043	-0.296	1.048	+0.311
$D\psi\alpha$, $D\omega\alpha$	+0.06	0.00	+0.03	-0.03	+0.07	+0.01	+0.05	-0.01
$D\psi\delta$, $D\omega\delta$	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Sagittarii. Mag. 4.2		♋ Pavonis. Mag. 4.1		♏ Aquilæ. Mag. 3.9		♐ Sagittæ. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 49 s	° ' -42 4 "	h m 19 51 s	° ' -73 7 "	h m 19 51 s	° ' + 6 11 "	h m 19 55 s	° ' +19 15 "
Jan. 1.1	36.064	67.19	5.67	45.41	16.864	66.70	6.180	71.56
11.0	36.157 93	65.69 150	5.77 10	42.34 307	16.926 62	65.27 143	6.228 48	69.50 206
21.0	36.300 143	64.14 155	6.02 25	39.23 311	17.024 98	63.85 142	6.313 85	67.42 208
31.0	36.488 188	62.56 158	6.38 36	36.17 306	17.156 132	62.51 134	6.433 120	65.41 201
Feb. 9.9	36.717 229	60.98 158	6.87 49	33.20 297	17.319 163	61.32 119	6.587 154	63.56 185
	266	156	58	280	190	99	185	161
19.9	36.983	59.42	7.45	30.40	17.509	60.33	6.772	61.95
Mar. 1.9	37.281 298	57.90 152	8.13 68	27.85 255	17.725 216	59.60 73	6.987 215	60.67 128
11.9	37.605 324	56.44 146	8.89 76	25.56 229	17.963 238	59.18 42	7.226 239	60.67 92
21.8	37.953 348	55.06 138	9.71 82	23.61 195	18.221 258	59.10 8	7.489 263	59.75 48
31.8	38.320 367	53.79 127	10.58 87	22.01 160	18.495 274	59.38 28	7.768 279	59.27 3
	382	113	90	121	286	63	293	43
Apr. 10.8	38.702	52.66	11.48	20.80	18.781	60.01	8.061	59.67
20.7	39.092 390	51.66 100	12.39 91	19.98 82	19.075 294	60.97 96	8.364 303	60.56 89
30.7	39.486 394	50.83 83	13.30 91	19.60 38	19.372 297	62.24 127	8.668 304	61.85 129
May 10.7	39.876 390	50.21 62	14.20 90	19.64 4	19.667 295	63.77 153	8.969 301	63.53 168
20.7	40.256 380	49.80 41	15.06 86	20.10 46	19.953 296	65.51 174	9.261 292	65.52 199
	359	18	79	88	271	190	275	224
30.6	40.615	49.62	15.85	20.98	20.224	67.41	9.536	67.76
June 9.6	40.949 334	49.67 5	16.58 73	22.26 128	20.473 249	69.40 199	9.788 252	70.19 243
19.6	41.248 299	49.94 27	17.23 65	23.89 163	20.695 222	71.43 203	10.011 223	72.73 254
29.6	41.504 256	50.48 54	17.76 53	25.82 193	20.886 191	73.45 202	10.200 189	75.32 259
July 9.5	41.712 208	51.21 73	18.17 41	28.02 220	21.037 151	75.40 195	10.348 148	77.90 258
	154	91	28	238	111	185	106	250
19.5	41.866 96	52.12 106	18.45 15	30.40 250	21.148 67	77.25 170	10.454 61	80.40 237
29.5	41.962 36	53.18 117	18.60 0	32.90 252	21.215 22	78.95 151	10.515 14	82.77 218
Aug. 8.4	41.998 23	54.35 121	18.60 15	35.42 247	21.237 21	80.46 132	10.529 30	84.95 198
18.4	41.976 78	55.56 120	18.45 27	37.89 232	21.216 62	81.78 110	10.499 73	86.93 172
28.4	41.898 128	56.76 114	18.18 39	40.21 208	21.154 98	82.88 89	10.426 110	88.65 144
Sept. 7.4	41.770	57.90	17.79	42.29	21.056	83.77	10.316	90.09
17.3	41.600 170	58.93 103	17.29 50	44.04 175	20.927 129	84.42 65	10.176 140	91.23 114
27.3	41.396 204	59.79 86	16.70 59	45.39 135	20.775 152	84.85 43	10.010 166	92.06 83
Oct. 7.3	41.172 224	60.42 63	16.06 64	46.28 89	20.608 167	85.04 19	9.829 181	92.56 50
17.3	40.939 233	60.81 39	15.39 67	46.66 39	20.437 171	85.01 3	9.643 186	92.73 17
	228	10	68	16	167	27	185	17
27.2	40.711	60.91	14.71	46.50	20.270	84.74	9.458	92.56
Nov. 6.2	40.501 210	60.74 17	14.07 64	45.80 70	20.115 155	84.27 47	9.286 172	92.05 51
16.2	40.318 183	60.30 44	13.50 57	44.58 122	19.981 134	83.58 69	9.134 152	91.22 83
26.1	40.174 144	59.58 72	13.01 49	42.86 172	19.874 107	82.69 89	9.008 126	90.06 116
Dec. 6.1	40.076 98	58.65 93	12.62 39	40.72 214	19.800 74	81.63 106	8.914 94	88.63 143
	49	115	26	251	38	124	58	170
16.1	40.027	57.50	12.36	38.21	19.762	80.39	8.856	86.93
26.1	40.032 5	56.20 130	12.24 12	35.44 277	19.759 3	79.04 135	8.837 19	85.05 188
36.0	40.088 56	54.78 142	12.25 1	32.46 298	19.796 37	77.62 142	8.856 19	83.02 208
Mean Place	36.354	65.42	7.691	42.45	17.122	63.95	6.598	67.12
Sec δ, Tan δ	1.348	-0.903	3.445	-3.297	1.006	+0.109	1.059	+0.350
D _α α, D _α α	+0.08	+0.03	+0.14	+0.10	+0.06	0.00	+0.05	-0.01
D _δ δ, D _α δ	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Sagittarii. Mag. 4.6		♑ Aquilæ. Mag. 5.6		♗ Aquilæ. Mag. 3.4		♏ Cygni seq. Mag. 4.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 57 s	° ' -27 56 "	h m 20 0 s	° ' + 7 2 "	h m 20 7 s	° ' - 1 3 "	h m 20 11 s	° ' +46 29 "
Jan. 1.1	36.950	20.61	7.818	48.60	4.300	53.60	1.883	40.39
11.0	37.028 78	19.97 64	7.872 54	47.17 143	4.354 54	54.57 97	1.861 22	37.47 292
21.0	37.145 117	19.26 71	7.960 88	45.74 143	4.441 87	55.51 94	1.893 32	34.44 303
31.0	37.300 155	18.49 77	8.083 123	44.39 135	4.562 121	56.38 87	1.979 86	31.41 303
Feb. 10.0	37.489 189	17.66 83	8.237 154	43.18 121	4.714 152	57.11 73	2.119 140	28.50 291
	219	89	182	101	179	57	188	265
19.9	37.708	16.77	8.419	42.17	4.893	57.68	2.307	25.85
Mar. 1.9	37.955 247	15.83 94	8.628 209	41.43 74	5.099 208	58.01 33	2.543 236	23.55 230
11.9	38.226 271	14.83 100	8.860 232	40.98 45	5.328 229	58.11 10	2.820 277	21.69 186
21.8	38.517 291	13.78 105	9.114 254	40.89 9	5.579 251	57.91 20	3.134 314	20.36 133
31.8	38.827 310	12.69 109	9.384 270	41.16 27	5.846 267	57.44 47	3.478 344	19.60 76
	323	110	284	62	284	77	364	16
Apr. 10.8	39.150	11.59	9.668	41.78	6.130	56.67	3.842	19.44
20.8	39.484 334	10.49 110	9.961 293	42.74 96	6.423 293	55.64 103	4.220 378	19.91 47
30.7	39.821 337	9.42 107	10.258 297	44.02 128	6.722 299	54.36 128	4.601 381	20.95 104
May 10.7	40.158 337	8.42 100	10.555 297	45.58 156	7.022 300	52.90 146	4.978 377	22.54 159
20.7	40.487 329	7.51 91	10.844 289	47.35 177	7.315 293	51.27 163	5.340 362	24.63 209
	316	78	275	193	283	172	337	252
30.7	40.803	6.73	11.119	49.28	7.598	49.55	5.677	27.15
June 9.6	41.097 294	6.10 63	11.374 255	51.33 205	7.860 262	47.78 177	5.981 304	30.02 287
19.6	41.362 265	5.63 47	11.603 229	53.42 209	8.098 238	46.01 177	6.245 264	33.16 314
29.6	41.594 232	5.35 28	11.799 196	55.51 209	8.305 207	44.28 173	6.462 217	36.49 333
July 9.5	41.784 190	5.25 10	11.958 159	57.54 203	8.475 170	42.66 162	6.627 165	39.91 342
	144	7	118	192	130	150	108	344
19.5	41.928 95	5.32 25	12.076 75	59.46 178	8.605 86	41.16 136	6.735 49	43.35 338
29.5	42.023 45	5.57 38	12.151 30	61.24 159	8.691 42	39.80 117	6.784 9	46.73 324
Aug. 8.5	42.068 7	5.95 49	12.181 14	62.83 142	8.733 2	38.63 99	6.775 67	49.97 303
18.4	42.061 54	6.44 57	12.167 55	64.25 118	8.731 45	37.64 80	6.708 121	53.00 278
28.4	42.007 96	7.01 60	12.112 92	65.43 96	8.686 83	36.84 60	6.587 170	55.78 245
Sept. 7.4	41.911	7.61	12.020	66.39	8.603	36.24	6.417	58.23
17.4	41.777 134	8.21 60	11.896 124	67.10 71	8.488 115	35.81 43	6.206 211	60.31 208
27.3	41.614 163	8.77 56	11.749 147	67.59 49	8.348 140	35.58 23	5.962 244	61.98 167
Oct. 7.3	41.434 180	9.26 49	11.584 165	67.84 25	8.191 157	35.50 8	5.694 268	63.20 122
17.3	41.246 188	9.63 37	11.414 170	67.86 2	8.026 165	35.59 9	5.413 281	63.96 76
	186	24	167	22	162	25	284	24
27.2	41.060	9.87 11	11.247 157	67.64 44	7.864 153	35.84 38	5.129 277	64.20 28
Nov. 6.2	40.889 149	9.98 3	11.090 138	67.20 67	7.711 135	36.22 53	4.852 258	63.92 78
16.2	40.740 117	9.95 17	10.952 111	66.53 86	7.576 108	36.75 66	4.594 232	63.14 128
26.2	40.623 80	9.78 30	10.841 80	65.67 105	7.468 79	37.41 76	4.362 196	61.86 175
Dec. 6.1	40.543 39	9.48 40	10.761 47	64.62 122	7.389 46	38.17 87	4.166 154	60.11 218
16.1	40.504 4	9.08 50	10.714 9	63.40 134	7.343 8	39.04 93	4.012 108	57.93 254
26.1	40.508 48	8.58 59	10.705 27	62.06 143	7.335 28	39.97 98	3.904 57	55.39 261
36.1	40.556	7.99	10.732	60.63	7.363	40.95	3.847	52.58
Mean Place	37.099	19.79	8.066	45.43	4.467	55.92	3.022	31.56
Sec δ, Tan δ	1.132	-0.530	1.008	+0.124	1.000	-0.019	1.453	+1.054
Dψ α, Dω α	+0.07	+0.02	+0.06	0.00	+0.06	0.00	+0.04	-0.04
Dψ δ, Dω δ	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9	+0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Pavonis. Mag. 2.1		γ Cygni. Mag. 2.3		π Capricorni. Mag. 5.2		ρ Capricorni. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 19 s	° ' " -56 59 "	h m 20 19 s	° ' " +39 59 "	h m 20 22 s	° ' " -18 28 "	h m 20 24 s	° ' " -18 4 "
Jan. 1.1	9.505	60.32	16.262	45.60	37.672	52.51	11.041	68.08
11.0	9.551 46	58.02 230	16.249 13	42.88 272	37.718 46	52.42 9	11.086 45	68.01 7
21.0	9.664 113	55.59 243	16.283 34	40.06 282	37.802 84	52.25 17	11.167 81	67.87 14
31.0	9.841 177	53.09 250	16.363 80	37.23 283	37.920 118	51.99 26	11.283 116	67.63 24
Feb. 10.0	10.079 238	50.59 250	16.490 127	34.53 270	38.070 150	51.64 35	11.431 148	67.30 33
	293	245	171	247	180	48	178	46
19.9	10.372	48.14	16.661	32.06	38.250	51.16	11.609	66.84
Mar. 1.9	10.715 343	45.77 237	16.874 213	29.92 214	38.458 208	50.56 60	11.815 206	66.25 59
11.9	11.101 386	43.54 223	17.125 251	28.20 172	38.691 233	49.81 75	12.045 230	65.51 74
21.9	11.526 425	41.50 204	17.408 283	26.97 123	38.947 256	48.93 88	12.300 253	64.64 87
31.8	11.984 458	39.66 184	17.719 311	26.30 67	39.223 276	47.92 101	12.575 275	63.63 101
	484	158	333	11	294	114	292	114
Apr. 10.8	12.468	38.08	18.052	26.19	39.517	46.78	12.867	62.49
20.8	12.970 502	36.76 132	18.400 348	26.68 49	39.825 308	45.54 124	13.173 306	61.26 123
30.7	13.482 512	35.76 100	18.753 353	27.72 104	40.141 316	44.24 130	13.488 315	59.95 131
May 10.7	13.995 513	35.09 67	19.103 350	29.27 155	40.460 319	42.93 181	13.806 318	58.62 133
20.7	14.500 505	34.76 33	19.445 342	31.30 203	40.776 316	41.62 131	14.122 316	57.29 133
	484	2	322	244	306	127	306	129
30.7	14.984	34.78	19.767	33.74	41.082	40.35	14.428	56.00
June 9.6	15.438 454	35.15 37	20.061 294	36.50 276	41.372 290	39.18 117	14.718 290	54.81 119
19.6	15.850 412	35.87 72	20.322 261	39.52 302	41.638 266	38.12 106	14.984 266	53.73 108
29.6	16.211 361	36.91 104	20.540 218	42.71 319	41.874 236	37.21 91	15.221 237	52.79 94
July 9.6	16.511 300	38.24 133	20.713 173	45.99 328	42.073 199	36.47 74	15.420 199	52.03 76
	231	159	121	329	158	56	159	60
19.5	16.742	39.83	20.834	49.28	42.231	35.91	15.579	51.43
29.5	16.898 156	41.59 176	20.902 68	52.50 322	42.344 113	35.53 38	15.693 114	51.03 40
Aug. 8.5	16.974 76	43.49 190	20.916 14	55.58 308	42.409 65	35.34 19	15.760 67	50.82 21
18.4	16.972 2	45.45 196	20.878 38	58.48 290	42.427 18	35.31 3	15.779 19	50.76 6
28.4	16.893 79	47.39 194	20.789 89	61.11 263	42.399 28	35.41 10	15.752 27	50.84 8
	151	185	135	233	71	23	69	22
Sept. 7.4	16.742	49.24	20.654	63.44	42.328	35.64	15.683	51.06
17.4	16.528 214	50.90 166	20.480 174	65.42 198	42.221 107	35.96 82	15.577 106	51.35 29
27.3	16.262 266	52.33 143	20.274 206	67.00 158	42.086 135	36.32 36	15.442 135	51.71 36
Oct. 7.3	15.958 304	53.44 111	20.046 228	68.16 116	41.929 157	36.70 38	15.287 155	52.09 38
17.3	15.633 325	54.17 73	19.805 241	68.88 72	41.760 169	37.09 39	15.119 168	52.48 39
	331	33	214	25	169	36	168	36
27.3	15.302	54.50	19.561	69.13	41.591	37.45	14.951	52.84
Nov. 6.2	14.981 321	54.40 10	19.322 239	68.90 23	41.431 160	37.77 32	14.791 160	53.17 33
16.2	14.689 292	53.87 53	19.100 222	68.19 71	41.287 144	38.04 27	14.646 145	53.45 28
26.2	14.438 251	52.93 94	18.902 198	67.01 118	41.169 118	38.24 20	14.527 119	53.66 21
Dec. 6.1	14.238 200	51.60 133	18.734 168	65.39 162	41.080 89	38.39 15	14.437 90	53.83 17
	138	167	130	202	54	9	55	11
16.1	14.100	49.93	18.604	63.37	41.026	38.48	14.382	53.94
26.1	14.027 73	47.97 196	18.515 89	61.02 235	41.009 17	38.51 3	14.364 18	53.99 5
36.1	14.025 2	45.78 219	18.471 44	58.40 262	41.029 20	38.48 3	14.383 19	53.98 1
Mean Place	10.101	56.52	17.100	36.92	37.750	52.61	11.114	68.24
Sec δ , Tan δ	1.836	-1.540	1.305	+0.839	1.054	-0.334	1.052	-0.326
$D_{\psi} \alpha$, $D_{\omega} \alpha$	+0.09	+0.06	+0.04	-0.03	+0.07	+0.01	+0.07	+0.01
$D_{\psi} \delta$, $D_{\omega} \delta$	+0.2	-0.8	+0.2	-0.8	+0.2	-0.8	+0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	41 Cygni. Mag. 4.1		θ Cephei. Mag. 4.3		ε Delphini. Mag. 4.0		Groombridge 3241. Mag. 6.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 26	° ' +30 5	h m 20 28	° ' +62 42	h m 20 29	° ' +11 1	h m 20 30	° ' +72 15
	s 8	" "	s 8	" "	s 8	" "	s 8	" "
Jan. 1.1	2.220	47.16	10.28	77.43	17.531	30.38	18.29	27.37
11.0	2.220 0	44.79 237	10.14 14	74.41 302	17.554 23	28.84 154	18.02 27	24.38 299
21.0	2.262 42	42.33 246	10.09 5	71.19 322	17.611 57	27.27 157	17.88 14	21.17 321
31.0	2.342 80	39.90 243	10.12 3	67.90 329	17.702 91	25.76 151	17.87 1	17.86 331
Feb. 10.0	2.463 121	37.57 233	10.24 12	64.67 323	17.826 124	24.38 138	18.00 13	14.56 330
	159	210	20	305	154	119	25	314
19.9	2.622	35.47 179	10.44	61.62	17.980	23.19 93	18.25	11.42
Mar. 1.9	2.814 192	33.68 141	10.73 29	58.89 273	18.163 183	22.26 61	18.62 37	8.56 286
11.9	3.041 227	32.27 96	11.08 35	56.56 233	18.375 212	21.65 26	19.12 50	6.10 246
21.9	3.298 257	31.31 45	11.49 41	54.74 182	18.610 235	21.39 12	19.70 58	4.13 197
31.8	3.578 280	30.86 6	11.96 47	53.50 124	18.868 258	21.51 49	20.36 66	2.73 140
	302		50	62	276		72	80
Apr. 10.8	3.880	30.92	12.46	52.88	19.144	22.00	21.08	1.93
20.8	4.196 316	31.50 58	12.98 52	52.91 3	19.434 290	22.89 89	21.83 75	1.78 15
30.7	4.520 324	32.59 109	13.51 53	53.56 65	19.734 300	24.12 123	22.59 76	2.27 49
May 10.7	4.845 325	34.14 155	14.04 53	54.83 127	20.036 302	25.68 156	23.34 75	3.39 112
20.7	5.163 318	36.11 197	14.55 51	56.66 183	20.336 300	27.49 181	24.06 72	5.08 169
	304	231	47	234	290	203	65	221
30.7	5.467	38.42	15.02	59.00	20.626	29.52	24.71	7.29
June 9.6	5.750 283	41.02 260	15.44 42	61.77 277	20.898 272	31.70 218	25.28 57	9.95 266
19.6	6.003 253	43.82 280	15.80 36	64.89 312	21.147 249	33.96 226	25.77 49	13.00 305
29.6	6.221 218	46.76 294	16.09 29	68.27 338	21.365 218	36.25 229	26.16 39	16.33 333
July 9.6	6.399 178	49.76 300	16.30 21	71.85 358	21.549 184	38.51 226	26.44 28	19.87 354
	132	298	14	366	143	218	14	366
19.5	6.531 85	52.74 290	16.44 5	75.51 367	21.692 99	40.69 204	26.58 4	23.53 370
29.5	6.616 35	55.64 276	16.49 3	79.18 360	21.791 55	42.73 189	26.62 9	27.23 366
Aug. 8.5	6.651 13	58.40 256	16.46 11	82.78 344	21.846 10	44.62 168	26.53 21	30.89 352
18.4	6.638 60	60.96 231	16.35 20	86.22 324	21.856 33	46.30 146	26.32 33	34.41 333
28.4	6.578 102	63.27 202	16.15 26	89.46 293	21.823 73	47.76 122	25.99 42	37.74 307
Sept. 7.4	6.476	65.29	15.89	92.39	21.750	48.98 97	25.57 51	40.81 273
17.4	6.339 137	66.99 170	15.57 32	94.98 259	21.643 107	49.95 71	25.06 60	43.54 236
27.3	6.172 167	68.35 97	15.19 38	97.16 218	21.510 133	50.66 45	24.46 65	45.90 190
Oct. 7.3	5.983 189	69.32 57	14.78 41	98.89 173	21.356 154	51.11 18	23.81 69	47.80 139
17.3	5.782 201	69.89 17	14.34 46	100.13 70	21.190 166	51.29 8	23.12 74	49.19 88
	205				167			
27.3	5.577	70.06	13.88	100.83	21.023	51.21 35	22.38 71	50.07 32
Nov. 6.2	5.378 199	69.81 66	13.43 45	100.98 42	20.863 160	50.86 59	21.67 71	50.39 26
16.2	5.193 185	69.15 107	12.98 41	100.56 99	20.716 147	49.43 84	20.96 68	50.13 83
26.2	5.031 162	68.08 144	12.57 37	99.57 153	20.590 100	48.38 105	20.28 62	49.30 141
Dec. 6.1	4.895 102	66.64 178	12.20 32	98.04 204	20.490 69	47.12 140	19.66 54	47.89 193
16.1	4.793	64.86	11.88	96.00	20.421	45.72 152	19.12 45	45.96 241
26.1	4.728 65	62.79 207	11.62 26	93.51 249	20.385 36	44.20 152	18.67 34	43.55 280
36.1	4.701 27	60.50 229	11.45 17	90.66 285	20.382 3		18.33	40.75
Mean Place	2.750	39.41	12.527	65.30	17.743	25.53	22.282	14.21
Sec δ, Tan δ	1.156	+0.580	2.182	+1.939	1.019	+0.195	3.281	+3.125
Dψ α, Dω α	+0.05	-0.02	+0.02	-0.08	+0.06	-0.01	0.00	-0.13
Dψ δ, Dω δ	+0.2	-0.8	+0.2	-0.8	+0.2	-0.8	+0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Delphini seq. Mag. 4.5		ε Cygni. Mag. 2.6		ε Aquarii. Mag. 3.8		η Cephei. Mag. 3.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 42	° ' +15 49	h m 20 42	° ' +33 39	h m 20 43	° ' - 9 47	h m 20 43	° ' +61 31
	s	"	s	"	s	"	s	"
Jan. 1.1	51.008	47.30	53.053	54.29	14.267	46.51	35.46	25.38
11.1	51.013 5	45.58 172	53.031 22	51.89 240	14.291 24	46.91 40	35.32 14	22.51 287
21.0	51.053 40	43.81 177	53.049 18	49.38 251	14.349 58	47.24 33	35.24 8	19.40 311
31.0	51.128 75	42.08 173	53.109 60	46.85 253	14.438 89	47.50 26	35.25 1	16.18 322
Feb. 10.0	51.236 108	40.46 162	53.210 101	44.40 245	14.560 122	47.62 12	35.34 9	12.98 329
	139	144	141	227	152	2	16	204
19.9	51.375	39.02	53.351	42.13	14.712	47.60	35.50	9.94
Mar. 1.9	51.547 172	37.85 117	53.531 180	40.16 197	14.891 179	47.41 19	35.76 26	7.16 278
11.9	51.749 202	37.00 85	53.749 218	38.57 159	15.098 207	47.01 40	36.07 31	4.77 239
21.9	51.977 228	36.51 49	54.000 251	37.42 115	15.329 231	46.41 60	36.45 38	2.86 191
31.8	52.230 253	36.44 7	54.279 279	36.77 65	15.583 254	45.58 83	36.89 44	1.51 135
	273	34	304	13	274	103	47	75
Apr. 10.8	52.503	36.78	54.583	36.64	15.857	44.55	37.36	0.76 12
20.8	52.793 290	37.54 76	54.905 322	37.06 42	16.148 291	43.34 121	37.87 51	0.64 52
30.8	53.096 303	38.69 115	55.238 333	38.01 95	16.451 303	41.97 137	38.38 51	1.16 113
May 10.7	53.403 307	40.21 152	55.576 338	39.44 143	16.760 309	40.48 149	38.90 52	2.29 170
20.7	53.707 304	42.03 182	55.910 334	41.31 187	17.069 309	38.91 157	39.40 50	3.99 222
	297	208	320	227	302	160	47	
30.7	54.004	44.11	56.230	43.58	17.371	37.31	39.87	6.21 287
June 9.6	54.285 281	46.38 227	56.532 302	46.17 259	17.660 289	35.74 157	40.31 44	8.88 285
19.6	54.543 258	48.78 240	56.804 272	49.00 283	17.928 268	34.22 152	40.68 37	11.93 333
29.6	54.772 229	51.25 247	57.043 239	52.01 301	18.169 241	32.80 142	41.00 32	15.26 355
July 9.6	54.965 193	53.72 247	57.240 197	55.11 310	18.376 207	31.52 128	41.23 23	18.81 388
	154	242	151	312	168	112	17	
19.5	55.119	56.14	57.391	58.23	18.544	30.40	41.40	22.47 370
29.5	55.229 110	58.45 231	57.493 102	61.29 306	18.669 125	29.46 94	41.49 9	26.17 388
Aug. 8.5	55.294 65	60.60 215	57.545 52	64.24 295	18.749 80	28.70 76	41.50 1	29.83 352
18.5	55.313 19	62.58 198	57.547 2	67.02 278	18.784 35	28.14 56	41.43 7	33.35 335
28.4	55.289 24	64.31 173	57.500 47	69.55 253	18.773 11	27.76 38	41.27 16	36.70 387
	65	149	92	228	51	21	22	
Sept. 7.4	55.224	65.80	57.408	71.83	18.722	27.55	41.05	39.77 374
17.4	55.124 100	67.01 121	57.277 131	73.78 195	18.634 88	27.49 6	40.77 28	42.51 387
27.3	54.994 130	67.95 94	57.114 163	75.37 159	18.515 119	27.57 8	40.43 34	44.88 392
Oct. 7.3	54.843 151	68.59 64	56.927 187	76.58 121	18.374 141	27.76 19	40.06 37	46.80 394
17.3	54.677 166	68.93 34	56.724 203	77.39 81	18.220 154	28.04 28	39.65 41	48.24 398
	170	5	209	38	158	34	43	
27.3	54.507	68.98	56.515	77.77	18.062	28.38	39.22	49.16 37
Nov. 6.2	54.342 165	68.72 26	56.307 208	77.72 5	17.908 154	28.77 39	38.80 42	49.53 37
16.2	54.187 155	68.17 55	56.111 196	77.24 48	17.766 142	29.19 42	38.37 43	49.34 37
26.2	54.051 136	67.33 84	55.932 179	76.32 92	17.645 121	29.64 45	37.98 39	48.58 37
Dec. 6.2	53.939 112	66.23 110	55.780 152	74.98 134	17.549 96	30.11 47	37.62 36	47.26 37
	83	133	122	171	66	47	32	
16.1	53.856	64.90	55.658	73.27	17.483	30.58	37.30	45.42 37
26.1	53.803 53	63.37 153	55.570 88	71.23 204	17.449 34	31.04 46	37.04 26	43.11 37
36.1	53.785 18	61.68 169	55.520 50	68.95 228	17.448 1	31.48 44	36.84 20	40.41 37
Mean Place	51.231	41.06	53.597	44.88	14.303	48.10	37.451	11.97
Sec δ, Tan δ	1.039	+0.284	1.201	+0.666	1.015	-0.173	2.097	+1.843
Dψ α, Dω α	+0.06	-0.01	+0.05	-0.03	+0.06	+0.01	+0.02	-0.08
Dψ δ, Dω δ	+0.3	-0.8	+0.3	-0.8	+0.3	-0.8	+0.3	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Time.	μ Aquarii. Mag. 4.8		β Indi. Mag. 3.7		δ Vulpeculae. Mag. 5.2		γ Draconis. Mag. 5.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 48 s	° ' " - 9 17 "	h m 20 48 s	° ' " - 58 45 "	h m 20 51 s	° ' " + 27 44 "	h m 20 51 s	° ' " + 80 14 "
n. 1.1	13.920	29.08	24.115	56.71	3.517	51.37	13.50	59.69
11.1	13.940 20	29.50 42	24.100 15	54.38 233	3.498 19	49.21 216	12.83 67	56.96 273
21.0	13.992 52	29.85 35	24.156 56	51.85 253	3.516 18	46.95 226	12.38 45	53.92 304
31.0	14.078 86	30.11 26	24.278 122	49.20 265	3.572 56	44.67 228	12.17 21	50.70 322
eb. 10.0	14.194 116 146	30.25 14 0	24.466 188 248	46.49 271 272	3.665 93 131	42.47 220 201	12.20 3 29	47.42 328 320
20.0	14.340	30.25	24.714	43.77	3.796	40.46	12.49	44.22
ar. 1.9	14.515 175	30.05 20	25.018 304	41.10 267	3.963 167	38.72 174	13.00 51	41.23 299
11.9	14.717 202	29.66 39	25.373 355	38.55 255	4.165 202	37.32 140	13.74 74	38.56 267
21.9	14.944 227	29.05 61	25.775 402	36.14 241	4.398 233	36.34 98	14.67 93	36.32 224
31.8	15.195 251 271	28.23 82 104	26.217 442 476	33.93 221 197	4.660 262 286	35.83 51 2	15.74 107 122	34.59 173 116
pr. 10.8	15.466	27.19	26.693	31.96	4.946	35.81	16.96	33.43
20.8	15.754 288	25.96 123	27.198 505	30.26 170	5.252 306	36.30 49	18.23 127	32.89 54
30.8	16.056 302	24.58 138	27.721 523	28.87 139	5.570 318	37.26 96	19.54 131	33.00 11
ay 10.7	16.364 308	23.07 151	28.252 531	27.84 103	5.894 324	38.67 141	20.85 131	33.71 71
20.7	16.673 309 303	21.48 159 162	28.783 531 518	27.17 67 29	6.217 323 313	40.50 183 219	22.09 124 116	35.02 131 186
30.7	16.976	19.86	29.301	26.88	6.530	42.69	23.25	36.88
ine 9.7	17.266 290	18.25 161	29.795 494	26.99 11	6.826 296	45.16 247	24.29 104	39.23 235
19.6	17.537 271	16.69 156	30.252 457	27.47 48	7.097 271	47.84 268	25.17 88	41.99 276
29.6	17.780 243	15.23 146	30.662 410	28.33 86	7.337 240	50.67 283	25.87 70	45.11 312
ily 9.6	17.990 210 172	13.91 132 115	31.014 352 283	29.53 120 150	7.539 202 159	53.58 291 291	26.39 52 31	48.47 336 358
19.5	18.162 130	12.76 98	31.297 208	31.03 177	7.698 113	56.49 285	26.70 11	52.05 367
29.5	18.292 85	11.78 78	31.505 126	32.80 194	7.811 66	59.34 272	26.81 11	55.72 368
ug. 8.5	18.377 39	11.00 60	31.631 44	34.74 206	7.877 17	62.06 255	26.70 33	59.40 363
18.5	18.416 6	10.40 41	31.675 39	36.80 211	7.894 30	64.61 233	26.37 51	63.03 348
28.4	18.410 46	9.99 22	31.636 117	38.91 206	7.864 72	66.94 206	25.86 71	66.51 328
pt. 7.4	18.364	9.77 7	31.519	40.97	7.792	69.00	25.15	69.79
17.4	18.279 85	9.70 6	31.330 189	42.90 193	7.681 111	70.76 176	24.28 87	72.81 302
27.4	18.164 115	9.76 18	31.079 251	44.61 171	7.539 142	72.20 144	23.26 102	75.46 265
ct. 7.3	18.027 137	9.94 28	30.783 296	46.04 143	7.371 168	73.28 108	22.10 116	77.74 228
17.3	17.875 152 157	10.22 34	30.454 329 344	47.11 107 66	7.189 182 189	73.99 71 32	20.86 124 131	79.56 182 131
27.3	17.718	10.56	30.110	47.77 22	7.000	74.31 7	19.55	80.87 76
ov. 6.2	17.564 154	10.95 39	29.765 345	47.99 24	6.811 189	74.24 46	18.21 134	81.63 19
16.2	17.422 142	11.39 47	29.438 294	47.75 69	6.632 179	73.79 86	16.87 131	81.82 38
26.2	17.300 122	11.86 48	29.144 248	45.93 113	6.471 161	72.93 121	15.56 124	81.44 98
ec. 6.2	17.201 69	12.34 49	28.896 192	44.40 187	6.331 111	71.72 156	14.32 111	80.46 155
16.1	17.132	12.83	28.704	42.53 218	6.220	70.16	13.21	78.91 206
26.1	17.095 37	13.31 46	28.574 130	40.35	6.141 79	68.32 184	12.23 98	76.65 248
36.1	17.090 5	13.77	28.512		6.096 45	66.24 208	11.43 80	74.37
n Place	13.943	30.79	24.687	51.55	3.894	42.52	21.084	43.95
δ , Tan δ	1.013	-0.164	1.928	-1.649	1.130	+0.526	5.905	+5.820
μ , $D_{\mu} \alpha$	+0.06	+0.01	+0.09	+0.07	+0.05	-0.02	-0.05	-0.26
μ , $D_{\mu} \delta$	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cygni. Mag. 4.0			α Octantis. Mag. 5.2			γ Microscopii. Mag. 4.7			θ Capricorni. Mag. 4.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	20	54	+40 50	20	54	-77 19	20	56	-32 34	21	1	-17 33
	s		"	s		"	s		"	s		"
Jan. 1.1	6.232		74.33	47.20		84.35	15.908		46.96	20.404		34.15
11.1	6.179	53	71.79 254	47.00	20	81.26 309	15.919	11	46.04 92	20.413	9	34.09 6
21.0	6.170	9	69.09 270	46.99	1	77.98 328	15.969	50	44.97 107	20.456	43	33.93 16
31.0	6.207	37	66.33 276	47.13	14	74.57 341	16.058	89	43.76 121	20.532	76	33.64 29
Feb. 10.0	6.291	84	63.62 271	47.44	31	71.13 344	16.184	126	42.43 133	20.640	108	33.24 40
		130	255		48	337		162	142		139	55
20.0	6.421		61.07	47.92		67.76	16.346		41.01	20.779		32.69
Mar. 1.9	6.595	174	58.78 229	48.53	61	64.50 326	16.540	194	39.50 151	20.948	169	31.98 71
11.9	6.813	218	56.87 191	49.27	74	61.44 306	16.767	227	37.92 158	21.145	197	31.13 85
21.9	7.070	257	55.40 147	50.12	85	58.63 281	17.023	256	36.28 164	21.371	226	30.11 102
31.9	7.361	291	54.46 94	51.07	95	56.15 248	17.305	282	34.63 165	21.622	251	28.93 118
		320	41		104	213		308	165		273	130
Apr. 10.8	7.681		54.05	52.11		54.02	17.613		32.98	21.895		27.63
20.8	8.023	342	54.22 17	53.20	109	52.30 172	17.940	327	31.38 160	22.187	292	26.21 142
30.8	8.380	357	54.94 72	54.33	113	51.01 129	18.283	343	29.84 154	22.495	308	24.71 150
May 10.7	8.742	362	56.21 127	55.48	115	50.18 83	18.636	353	28.41 143	22.812	317	23.18 153
20.7	9.100	358	57.97 176	56.62	114	49.84 34	18.991	355	27.12 129	23.133	321	21.64 154
		346	220		111	12		349	110		317	150
30.7	9.446		60.17	57.73		49.96	19.340		26.02	23.450		20.14
June 9.7	9.772	326	62.75 258	58.78	105	50.57 61	19.677	337	25.13 89	23.755	305	18.72 142
19.6	10.066	294	65.62 287	59.73	95	51.63 106	19.992	315	24.48 65	24.043	288	17.43 129
29.6	10.324	258	68.72 310	60.59	86	53.13 150	20.280	288	24.08 40	24.305	262	16.31 112
July 9.6	10.538	214	71.96 324	61.32	73	55.00 187	20.530	250	23.94 14	24.535	230	15.36 95
		165	331		58	220		207	11		191	74
19.5	10.703		75.27	61.90		57.20	20.737		24.05	24.726		14.62
29.5	10.816	113	78.57 330	62.30	40	59.67 247	20.897	160	24.41 36	24.874	148	14.08 54
Aug. 8.5	10.874	58	81.78 321	62.53	23	62.31 264	21.004	107	24.41 36	24.977	103	13.77 31
18.5	10.878	4	84.84 306	62.57	4	65.05 274	21.058	54	24.97 56	25.032	55	13.64 13
28.4	10.829	49	87.69 285	62.43	14	67.76 271	21.059	1	25.73 76	25.040	8	13.70 6
		97	258		33	260		48	98		36	22
Sept. 7.4	10.732		90.27	62.10		70.36	21.011		27.60	25.004		13.92
17.4	10.593	139	92.54 227	61.60	50	72.76 240	20.918	93	28.62 102	24.928	76	14.26 34
27.4	10.416	177	94.46 192	60.97	63	74.83 207	20.786	132	29.62 100	24.818	110	14.69 43
Oct. 7.3	10.211	205	95.97 151	60.21	76	76.51 168	20.625	161	30.55 93	24.683	135	15.17 48
17.3	9.987	224	97.04 107	59.37	84	77.71 120	20.445	180	31.36 81	24.531	152	15.68 51
		234	63		90	68		189	64		159	56
27.3	9.753		97.67	58.47		78.39	20.256		32.00	24.372		16.18
Nov. 6.2	9.517	236	97.82 15	57.55	92	78.49 10	20.069	187	32.46 46	24.213	159	16.64 44
16.2	9.290	227	97.49 33	56.67	88	78.00 49	19.894	175	32.70 24	24.063	150	17.06 41
26.2	9.079	211	96.68 81	55.84	83	76.93 107	19.740	154	32.73 3	23.931	132	17.41 31
Dec. 6.2	8.892	187	95.40 128	55.10	74	75.31 162	19.613	127	32.52 21	23.824	107	17.68 27
		157	171		61	211		94	41		79	1
16.1	8.735		93.69	54.49		73.20	19.519		32.11	23.745		17.87
26.1	8.614	121	91.61 208	54.03	46	70.65 255	19.463	56	31.49 62	23.696	49	17.98 1
36.1	8.532	82	89.22 239	53.73	30	67.77 288	19.446	17	30.69 80	23.682	14	18.00
Mean Place	6.925		62.96	49.790		77.99	15.945		44.62	20.376		34.36
Sec δ, Tan δ	1.322		+0.865	4.561		-4.450	1.187		-0.639	1.049		-0.316
Dψ α, Dω α	+0.04		-0.04	+0.15		+0.20	+0.07		+0.03	+0.07		+0.02
Dψ δ, Dω δ	+0.3		-0.7	+0.3		-0.7	+0.3		-0.7	+0.3		-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Cygni. Mag. 3.9		61 Cygni pr. Mag. 5.6		ν Aquarii. Mag. 4.5		Bradley 2777. Mag. 5.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 1	° ' " +43 35	h m 21 3	° ' " +38 20	h m 21 5	° ' " -11 41	h m 21 7	° ' " +77 47
Jan. 1.1	56.118 70	73.34 254	12.574 41	55.07 233	7.752 5	74.17 26	4.57 57	55.83 266
11.1	56.048 24	70.80 273	12.533 1	52.74 249	7.757 37	74.43 18	4.00 39	53.17 296
21.0	56.024 23	68.07 281	12.532 44	50.25 256	7.794 69	74.61 9	3.61 22	50.21 318
31.0	56.047 72	65.26 279	12.576 88	47.69 252	7.863 99	74.70 5	3.39 3	47.03 327
Feb. 10.0	56.119 121	62.47 204	12.664 131	45.17 236	7.962 131	74.65 20	3.36 18	43.76 323
20.0	56.240 168	59.83 240	12.795 175	42.81 209	8.093 160	74.45 38	3.54 36	40.53 306
Mar. 1.9	56.408 215	57.43 204	12.970 217	40.72 174	8.253 189	74.07 56	3.90 55	37.47 277
11.9	56.623 257	55.39 160	13.187 255	38.98 131	8.442 216	73.51 77	4.45 70	34.70 237
21.9	56.880 294	53.79 109	13.442 288	37.67 81	8.658 241	72.74 97	5.15 84	32.33 186
31.9	57.174 326	52.70 55	13.730 318	36.86 27	8.899 266	71.77 116	5.99 95	30.47 132
Apr. 10.8	57.500 351	52.15 4	14.048 340	36.59 28	9.165 284	70.61 132	6.94 102	29.15 70
20.8	57.851 366	52.19 61	14.388 357	36.87 82	9.449 300	69.29 147	7.96 107	28.45 8
30.8	58.217 375	52.80 115	14.745 383	37.69 135	9.749 310	67.82 157	9.03 107	28.37 55
May 10.7	58.592 372	53.95 168	15.108 362	39.04 184	10.059 313	66.25 162	10.10 105	28.92 115
20.7	58.964 360	55.63 214	15.470 350	40.88 226	10.372 311	64.63 164	11.15 97	30.07 172
30.7	59.324 339	57.77 253	15.820 332	43.14 263	10.683 300	62.99 160	12.12 89	31.79 222
June 9.7	59.663 309	60.30 286	16.152 304	45.77 292	10.983 282	61.39 153	13.01 79	34.01 268
19.6	59.972 272	63.16 311	16.456 269	48.69 314	11.265 258	59.86 141	13.80 65	36.69 304
29.6	60.244 227	66.27 328	16.725 228	51.83 327	11.523 225	58.45 126	14.45 50	39.73 333
July 9.6	60.471 177	69.55 336	16.953 180	55.10 333	11.748 190	57.19 107	14.95 35	43.06 355
19.6	60.648 122	72.91 338	17.133 131	58.43 331	11.938 146	56.12 88	15.30 18	46.61 368
29.5	60.770 67	76.29 331	17.264 77	61.74 324	12.084 102	55.24 67	15.48 0	50.29 373
Aug. 8.5	60.837 11	79.60 318	17.341 24	64.98 307	12.186 56	54.57 48	15.48 16	54.02 370
18.5	60.848 44	82.78 297	17.365 25	68.05 288	12.242 11	54.09 29	15.32 32	57.72 358
28.4	60.804 96	85.75 273	17.340 74	70.93 200	12.253 33	53.80 9	15.00 49	61.30 341
Sept. 7.4	60.708 140	88.48 241	17.266 117	73.53 231	12.220 71	53.71 5	14.51 62	64.71 315
17.4	60.568 179	90.89 205	17.149 150	75.84 195	12.149 103	53.76 18	13.89 74	67.86 284
27.4	60.389 211	92.94 166	16.999 182	77.79 156	12.046 130	53.94 29	13.15 86	70.70 245
Oct. 7.3	60.178 231	94.60 122	16.817 199	79.35 114	11.916 145	54.23 36	12.29 93	73.15 200
17.3	59.947 244	95.82 77	16.618 211	80.49 71	11.771 153	54.59 42	11.36 100	75.15 151
27.3	59.703 247	96.59 23	16.407 211	81.20 25	11.618 153	55.01 44	10.36 104	76.66 97
Nov. 6.3	59.456 241	96.87 22	16.196 205	81.45 22	11.465 144	55.45 45	9.32 105	77.63 39
16.2	59.215 227	96.65 71	15.991 190	81.23 68	11.321 128	55.90 45	8.27 103	78.02 19
26.2	58.988 203	95.94 119	15.801 167	80.55 112	11.193 106	56.35 44	7.24 98	77.83 78
Dec. 6.2	58.785 174	94.75 165	15.634 140	79.43 154	11.087 78	56.79 41	6.26 89	77.05 137
16.1	58.611 140	93.10 205	15.494 105	77.89 190	11.009 51	57.20 37	5.37 80	75.68 191
26.1	58.471 99	91.05 238	15.389 69	75.99 221	10.958 18	57.57 33	4.57 67	73.77 230
36.1	58.372	88.67	15.320	73.78	10.940	57.90	3.90	71.38
Mean Place	56.856	60.97	13.151	43.75	7.716	75.54	10.054	38.75
Sec δ, Tan δ	1.381	+0.952	1.275	+0.791	1.021	-0.207	4.732	+4.625
Dψa, Dωa	+0.04	-0.05	+0.05	-0.04	+0.06	+0.01	-0.02	-0.22
Dψδ, Dωδ	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♂ Piscis Australis. Mag. 5.6		ζ Cygni. Mag. 3.4		τ Cygni. Mag. 3.8		α Equulei. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 8 s	° ' " -27 56 "	h m 21 9 s	° ' " +29 53 "	h m 21 11 s	° ' " +37 41 "	h m 21 11 s	° ' " + 4 54 "
Jan. 1.1	25.796	78.03	26.396	34.01	30.532	53.35	43.494	34.43
11.1	25.796 0	77.38 65	26.357 39	31.87 214	30.473 59	51.04 231	43.484 10	33.32 111
21.1	25.833 37	76.59 79	26.352 5	29.61 226	30.452 21	48.54 250	43.507 23	32.20 112
31.0	25.906 73	75.66 93	26.386 34	27.29 232	30.474 22	45.96 258	43.559 52	31.13 107
Feb. 10.0	26.014 108	74.60 106	26.459 73	25.03 226	30.539 65	43.40 256	43.644 85	30.17 96
	140	121	111	211	109	243	114	7
20.0	26.154	73.39	26.570	22.92	30.648	40.97	43.758	29.38
Mar. 1.9	26.328 174	72.07 132	26.719 149	21.05 187	30.800 152	38.80 217	43.903 145	28.80 58
11.9	26.534 206	70.66 141	26.905 186	19.51 154	30.994 194	36.94 186	44.079 176	28.49 31
21.9	26.768 234	69.15 151	27.126 221	18.38 113	31.226 232	35.50 144	44.283 204	28.47 2
31.9	27.030 262	67.57 158	27.380 254	17.70 68	31.494 268	34.55 95	44.514 231	28.78 31
	287	163	280	19	300	43	255	64
Apr. 10.8	27.317	65.94	27.660	17.51	31.794	34.12	44.769	29.42
20.8	27.626 309	64.31 163	27.964 304	17.82 31	32.118 324	34.23 11	45.045 276	30.36 94
30.8	27.952 326	62.70 161	28.284 320	18.63 81	32.459 341	34.87 64	45.336 291	31.61 125
May 10.8	28.289 337	61.15 155	28.613 329	19.91 123	32.811 352	36.05 118	45.639 303	33.13 132
20.7	28.631 342	59.70 145	28.944 331	21.63 172	33.163 352	37.70 165	45.945 306	34.88 175
	339	131	325	210	345	210	303	191
30.7	28.970	58.39	29.269	23.73	33.508	39.80	46.248	36.79
June 9.7	29.299 329	57.27 112	29.578 309	26.14 241	33.836 328	42.26 246	46.541 293	38.81 202
19.6	29.609 310	56.34 93	29.866 288	28.80 266	34.139 303	45.03 277	46.817 276	40.90 209
29.6	29.895 286	55.64 70	30.123 257	31.64 284	34.409 270	48.03 300	47.067 250	42.99 209
July 9.6	30.146 251	55.19 45	30.343 220	34.58 294	34.638 229	51.16 313	47.287 220	45.03 204
	211	19	179	297	185	321	184	196
19.6	30.357 165	55.00	30.522 133	37.55	34.823 136	54.37	47.471 142	46.99 181
29.5	30.522 116	55.05 5	30.655 85	40.49 294	34.959 84	57.59 322	47.613 100	48.80 164
Aug. 8.5	30.638 66	55.34 29	30.740 35	43.34 285	35.043 31	60.75 316	47.713 54	50.44 145
18.5	30.704 15	55.81 47	30.775	46.03 269	35.074	63.75 300	47.767 11	51.89 123
28.4	30.719 33	56.46 78	30.764 57	48.51 248	35.054 68	66.58 283	47.778 31	53.12 101
Sept. 7.4	30.686	57.24	30.707	50.75	34.986	69.15	47.747	54.13
17.4	30.609 77	58.09 85	30.611 96	52.70 195	34.875 111	71.44 229	47.679 68	54.91 78
27.4	30.495 114	58.97 88	30.480 131	54.32 162	34.728 147	73.37 193	47.580 99	55.48 57
Oct. 7.3	30.352 143	59.83 86	30.322 158	55.59 127	34.550 178	74.94 157	47.455 125	55.82 34
17.3	30.187 165	60.61 78	30.145 177	56.50 91	34.351 199	76.10 116	47.314 141	55.94 12
	174	67	187	51	212	73	150	7
27.3	30.013	61.28	29.958	57.01	34.139	76.83	47.164	55.87
Nov. 6.3	29.839 174	61.83 55	29.769 189	57.12 11	33.924 215	77.11 28	47.014 150	55.59 28
16.2	29.674 165	62.21 38	29.585 184	56.81 31	33.715 209	76.93 18	46.870 144	55.13 46
26.2	29.525 149	62.40 19	29.415 170	56.11 70	33.517 198	76.30 63	46.740 130	54.49 64
Dec. 6.2	29.402 123	62.41 1	29.264 151	55.02 109	33.338 179	75.21 109	46.630 110	53.70 79
	94	18	126	145	152	149	87	92
16.1	29.308	62.23	29.138	53.57	33.186	73.72	46.543	52.78
26.1	29.247 61	61.88 35	29.041 97	51.80 177	33.065 121	71.85 187	46.484 59	51.76 102
36.1	29.221 26	61.36 52	28.977 64	49.77 203	32.979 86	69.65 220	46.454 30	50.64 112
Mean Place	25.770	76.27	26.728	23.71	31.030	41.41	43.505	29.40
Sec δ, Tan δ	1.132	-0.531	1.154	+0.575	1.264	+0.773	1.004	+0.086
Dψ α, Dω α	+0.07	+0.03	+0.05	-0.03	+0.05	-0.04	+0.06	0.00
Dψ δ, Dω δ	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	σ Cygni. Mag. 4.3		θ Microscopii. Mag. 4.9		α Cephei. Mag. 2.6		ι Capricorni. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 14 s	° ' " +39 2 "	h m 21 15 s	° ' " -41 9 "	h m 21 16 s	° ' " +62 14 "	h m 21 17 s	° ' " -17 10 "
a. 1.1	11.136 67	74.52 235	31.079 19	29.02 135	35.73 21	32.44 263	41.077 6	63.82 4
11.1	11.069 28	72.17 255	31.060 24	27.67 156	35.52 13	29.81 293	41.071 26	63.78 15
21.1	11.043 16	69.62 263	31.084 67	26.11 173	35.39 6	26.88 312	41.097 58	63.63 28
31.0	11.059 60	66.99 260	31.151 109	24.38 187	35.33 2	23.76 319	41.155 89	63.35 43
b. 10.0	11.119 105	64.39 249	31.260 149	22.51 198	35.35 11	20.57 312	41.244 123	62.92 58
20.0	11.224 150	61.90 225	31.409 187	20.53 204	35.46 19	17.45 294	41.367 152	62.34 73
cr. 1.9	11.374 192	59.65 194	31.596 225	18.49 209	35.65 26	14.51 262	41.519 181	61.61 89
11.9	11.566 232	57.71 151	31.821 261	16.40 209	35.91 34	11.89 221	41.700 211	60.72 107
21.9	11.798 271	56.20 103	32.082 294	14.31 207	36.25 41	9.68 171	41.911 237	59.65 123
31.9	12.069 302	55.17 51	32.376 322	12.24 199	36.66 46	7.97 114	42.148 263	58.42 136
cr. 10.8	12.371 327	54.66 5	32.698 348	10.25 189	37.12 49	6.83 54	42.411 284	57.06 149
20.8	12.698 346	54.71 59	33.046 368	8.36 174	37.61 53	6.29 10	42.695 303	55.57 158
30.8	13.044 356	55.30 112	33.414 382	6.62 154	38.14 53	6.39 70	42.998 314	53.99 162
ay 10.8	13.400 358	56.42 161	33.796 387	5.08 133	38.67 53	7.09 129	43.312 321	52.37 163
20.7	13.758 349	58.03 206	34.183 387	3.75 106	39.20 51	8.38 185	43.633 319	50.74 159
30.7	14.107 333	60.09 244	34.570 376	2.69 77	39.71 48	10.23 234	43.952 311	49.15 151
ne 9.7	14.440 308	62.53 275	34.946 356	1.92 47	40.19 44	12.57 277	44.263 295	47.64 139
19.6	14.748 274	65.28 300	35.302 328	1.45 15	40.63 36	15.34 311	44.558 272	46.25 122
29.6	15.022 235	68.28 315	35.630 290	1.30 16	40.99 32	18.45 338	44.830 241	45.03 104
ly 9.6	15.257 188	71.43 323	35.920 245	1.46 47	41.31 24	21.83 358	45.071 204	43.99 83
19.6	15.445 138	74.66 326	36.165 194	1.93 75	41.55 15	25.41 367	45.275 163	43.16 60
29.5	15.583 86	77.92 319	36.359 137	2.68 100	41.70 8	29.08 370	45.438 117	42.56 38
ig. 8.5	15.669 33	81.11 305	36.496 79	3.68 121	41.78 0	32.78 364	45.555 70	42.18 17
18.5	15.702 19	84.16 288	36.575 20	4.89 136	41.78 8	36.42 351	45.625 24	42.01 3
28.5	15.683 68	87.04 262	36.595 37	6.25 144	41.70 17	39.93 330	45.649 21	42.04 21
pt. 7.4	15.615 113	89.66 234	36.558 88	7.69 145	41.53 23	43.23 302	45.628 62	42.25 33
17.4	15.502 149	92.00 199	36.470 134	9.14 141	41.30 29	46.25 269	45.566 96	42.58 45
27.4	15.353 179	93.99 162	36.336 171	10.55 130	41.01 33	48.94 230	45.470 125	43.03 52
st. 7.3	15.174 202	95.61 121	36.165 196	11.85 110	40.68 38	51.24 184	45.345 144	43.55 55
17.3	14.972 216	96.82 78	35.969 212	12.95 89	40.30 41	53.08 135	45.201 153	44.10 55
27.3	14.756 220	97.60 32	35.757 215	13.84 60	39.89 41	54.43 83	45.048 156	44.65 52
ov. 6.3	14.536 216	97.92 14	35.542 207	14.44 30	39.48 42	55.26 26	44.892 149	45.17 48
16.2	14.320 204	97.78 62	35.335 190	14.74 0	39.06 42	55.52 32	44.743 135	45.65 41
26.2	14.116 185	97.16 107	35.145 162	14.74 34	38.64 39	55.20 89	44.608 114	46.06 33
ec. 6.2	13.931 159	96.09 150	34.983 128	14.40 64	38.25 35	54.31 146	44.494 89	46.39 23
16.2	13.772 128	94.59 187	34.855 92	13.76 93	37.90 31	52.85 196	44.405 59	46.62 14
26.1	13.644 94	92.72 221	34.763 49	12.83 119	37.59 24	50.89 241	44.346 29	46.76 5
36.1	13.550	90.51	34.714	11.64	37.35	48.48	44.317	46.81
Place	11.656	62.15	31.132	24.94	37.457	16.14	40.995	64.09
δ, Tan δ	1.288	+0.811	1.328	-0.874	2.148	+1.900	1.047	-0.309
, D _a α	+0.05	-0.04	+0.08	+0.04	+0.03	-0.10	+0.07	+0.02
, D _a δ	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	1 Pegasi. Mag. 4.2		γ Pavonis. Mag. 4.3		ζ Capricorni. Mag. 3.9		ε Cygni. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 18 s	° ' +19 27 "	h m 21 19 s	° ' -65 43 "	h m 21 21 s	° ' -22 45 "	h m 21 26 s	° ' +46 10 "
Jan. 1.1	17.514 29	19.52 172	40.07 12	85.17 255	59.412 11	62.82 34	24.689 105	57.43 239
11.1	17.485 —	17.80 180	39.95 3	82.62 281	59.401 23	62.48 48	24.584 61	55.04 265
21.1	17.487 2	16.00 182	39.92 6	79.81 302	59.424 55	62.00 63	24.523 13	52.39 278
31.0	17.523 36	14.18 174	39.98 13	76.79 311	59.479 87	61.37 78	24.510 37	49.61 283
Feb. 10.0	17.593 70	12.44 159	40.11 21	73.68 317	59.566 121	60.59 92	24.547 89	46.79 273
20.0	17.697 137	10.85 137	40.32 30	70.51 314	59.687 152	59.67 107	24.636 141	44.06 252
Mar. 1.9	17.834 172	9.48 106	40.62 36	67.37 304	59.839 182	58.60 122	24.777 192	41.54 223
11.9	18.006 203	8.42 70	40.98 43	64.33 290	60.021 214	57.38 134	24.969 238	39.31 182
21.9	18.209 233	7.72 31	41.41 49	61.43 263	60.235 241	56.04 147	25.207 282	37.49 135
31.9	18.442 260	7.41 13	41.90 54	58.75 244	60.476 269	54.57 156	25.489 322	36.14 8
Apr. 10.8	18.702 283	7.54 55	42.44 58	56.31 212	60.745 290	53.01 164	25.811 353	35.32 25
20.8	18.985 301	8.09 97	43.02 61	54.19 177	61.035 311	51.37 167	26.164 374	35.07 32
30.8	19.286 311	9.06 137	43.63 64	52.42 140	61.346 323	49.70 166	26.538 387	35.39 90
May 10.8	19.597 315	10.43 172	44.27 65	51.02 97	61.669 330	48.04 160	26.925 392	36.29 143
20.7	19.912 313	12.15 203	44.92 63	50.05 53	61.999 330	46.44 151	27.317 394	37.72 192
30.7	20.225 300	14.18 227	45.55 62	49.52 9	62.329 322	44.93 138	27.701 367	39.64 234
June 9.7	20.525 284	16.45 244	46.17 59	49.43 37	62.651 306	43.55 120	28.068 340	41.98 273
19.6	20.809 256	18.89 257	46.76 53	49.80 80	62.957 284	42.35 101	28.408 305	44.71 302
29.6	21.065 224	21.46 261	47.29 46	50.60 120	63.241 251	41.34 78	28.713 261	47.73 323
July 9.6	21.289 187	24.07 259	47.75 40	51.80 158	63.492 214	40.56 54	28.974 211	50.96 337
19.6	21.476 144	26.66 253	48.15 30	53.38 188	63.706 172	40.02 30	29.185 158	54.33 342
29.5	21.620 99	29.19 240	48.45 21	55.26 215	63.878 126	39.72 6	29.343 101	57.75 341
Aug. 8.5	21.719 53	31.59 224	48.66 11	57.41 231	64.004 77	39.66 16	29.444 41	61.16 332
18.5	21.772 8	33.83 202	48.77 1	59.72 240	64.081 28	39.82 34	29.485 15	64.48 316
28.5	21.780 34	35.85 179	48.78 11	62.12 240	64.109 19	40.16 51	29.470 68	67.64 294
Sept. 7.4	21.746 73	37.64 152	48.67 19	64.52 230	64.090 61	40.67 63	29.402 118	70.58 266
17.4	21.673 107	39.16 123	48.48 28	66.82 209	64.029 97	41.30 71	29.284 161	73.24 233
27.4	21.566 132	40.39 94	48.20 34	68.91 182	63.932 127	42.01 74	29.123 197	75.57 196
Oct. 7.3	21.434 150	41.33 62	47.86 41	70.73 144	63.805 148	42.75 71	28.926 224	77.53 154
17.3	21.284 161	41.95 31	47.45 43	72.17 101	63.657 160	43.46 67	28.702 241	79.07 108
27.3	21.123 164	42.26 1	47.02 45	73.18 53	63.497 163	44.13 59	28.461 251	80.15 80
Nov. 6.3	20.959 158	42.25 34	46.57 45	73.71 0	63.334 156	44.72 48	28.210 251	80.75 10
16.2	20.801 147	41.91 66	46.12 41	73.71 52	63.178 143	45.20 35	27.959 212	80.85 41
26.2	20.654 130	41.25 94	45.71 38	73.19 103	63.035 121	45.55 20	27.717 225	80.44 91
Dec. 6.2	20.524 106	40.31 123	45.33 30	72.16 151	62.914 97	45.75 7	27.492 200	79.53 140
16.2	20.418 80	39.08 145	45.03 27	70.65 196	62.817 66	45.82 9	27.292 169	78.13 183
26.1	20.338 52	37.63 166	44.76 18	68.69 232	62.751 35	45.73 23	27.123 133	76.30 222
36.1	20.286	35.97	44.58	66.37	62.716	45.50	26.990	74.08
Mean Place	17.638	11.02	40.868	78.14	59.323	61.92	25.354	42.94
Sec δ, Tan δ	1.061	+0.353	2.433	-2.218	1.084	-0.420	1.444	+1.042
Dψ α, Dω α	+0.05	-0.02	+0.10	+0.11	+0.07	+0.02	+0.04	-0.05
Dψ δ, Dω δ	+0.3	-0.6	+0.3	-0.6	+0.3	-0.6	+0.3	-0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Capricorni. Mag. 3.8			ε Pegasi. Mag. 2.5			11 Cephei. Mag. 4.8			δ Capricorni. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	21	35	-17 1	21	40	+ 9 29	21	40	+70 55	21	42	-16 29
	s		"	s		"	s		"	s		"
Jan. 1.1	33.151	21	59.43	9.574	35	61.28	40.93	39	80.24	31.186	27	59.62
11.1	33.130	8	59.41	9.539	7	60.04	40.54	29	77.89	31.159	2	59.64
21.1	33.138	40	59.26	9.532	23	58.78	40.25	19	75.15	31.161	32	59.54
31.0	33.178	72	58.96	9.555	53	57.53	40.06	8	72.12	31.193	64	59.28
Feb. 10.0	33.250	102	58.53	9.608	84	56.37	39.98	4	68.94	31.257	93	58.88
20.0	33.352		57.93	9.692		55.35	40.02		65.72	31.350		58.31
Mar. 2.0	33.484	132	57.16	9.809	117	54.54	40.20	18	62.62	31.475	125	57.56
11.9	33.648	164	56.22	9.958	149	53.99	40.49	29	59.73	31.632	157	56.64
21.9	33.842	194	55.09	10.138	180	53.74	40.89	40	57.19	31.819	187	55.52
31.9	34.066	224	53.81	10.350	212	53.82	41.39	50	55.09	32.036	217	54.24
		251			238			58	157		246	
Apr. 10.9	34.317		52.38	10.588		54.26	41.97		53.52	32.282		52.81
20.8	34.591	274	50.82	10.853	265	55.05	42.62	65	52.51	32.553	271	51.24
30.8	34.886	295	49.16	11.138	285	56.18	43.33	71	52.13	32.845	292	49.56
May 10.8	35.197	311	47.45	11.438	300	57.61	44.05	72	52.37	33.154	309	47.83
20.7	35.516	319	45.73	11.747	309	59.32	44.78	73	53.21	33.473	319	46.08
		322			309			71	144		322	
30.7	35.838		44.05	12.056		61.25	45.49		54.65	33.795		44.37
June 9.7	36.155	317	42.46	12.359	303	63.35	46.15	66	56.62	34.113	318	42.74
19.7	36.457	302	40.98	12.649	290	65.55	46.77	62	59.06	34.417	304	41.22
29.6	36.740	283	39.66	12.917	268	67.81	47.31	54	61.93	34.703	286	39.86
July 9.6	36.993	253	38.54	13.157	240	70.06	47.77	46	65.13	34.961	258	38.70
		219			206			36	347		223	
19.6	37.212		37.63	13.363		72.25	48.13		68.60	35.184		37.75
29.6	37.391	170	36.97	13.529	166	74.32	48.37	24	72.24	35.368	184	37.05
Aug. 8.5	37.525	134	36.53	13.653	124	76.26	48.52	15	75.99	35.509	141	36.57
18.5	37.613	88	36.33	13.734	81	78.02	48.56	4	79.75	35.604	95	36.33
28.5	37.654	41	36.34	13.770	36	79.55	48.48	8	83.45	35.652	48	36.31
		4			6			18	356		2	
Sept. 7.4	37.650		36.54	13.764		80.88	48.30		87.01	35.654		36.49
17.4	37.605	45	36.89	13.720	44	81.95	48.01	29	90.37	35.615	39	36.83
27.4	37.523	82	37.37	13.640	80	82.79	47.64	37	93.44	35.539	76	37.30
Oct. 7.4	37.411	112	37.93	13.535	105	83.37	47.20	44	96.16	35.433	106	37.86
17.3	37.278	133	38.54	13.407	128	83.71	46.68	52	98.48	35.304	129	38.48
		147			140			56	184		142	
27.3	37.131		39.15	13.267		83.82	46.12		100.32	35.162		39.11
Nov. 6.3	36.980	151	39.74	13.122	145	83.68	45.52	60	101.65	35.014	148	39.73
16.3	36.832	148	40.29	12.979	143	83.34	44.90	62	102.42	34.867	147	40.30
26.2	36.695	137	40.76	12.844	135	82.77	44.28	62	102.60	34.731	136	40.81
Dec. 6.2	36.576	119	41.15	12.724	120	82.00	43.67	61	102.17	34.611	120	41.24
		98			103			57	101		101	
16.2	36.478		41.44	12.621		81.06	43.10		101.16	34.510		41.58
26.1	36.407	71	41.61	12.542	79	79.97	42.58	52	99.58	34.435	75	41.79
36.1	36.364	43	41.69	12.487	55	78.76	42.13	45	97.48	34.386	49	41.91
Mean Place	33.003		59.72	9.499		54.41	43.503		61.05	31.012		60.02
Sec δ, Tan δ	1.046		-0.306	1.014		+0.167	3.062		+2.894	1.043		-0.296
Dψ α, Dω α	+0.07		+0.02	+0.06		-0.01	+0.02		-0.16	+0.06		+0.02
Dψ δ, Dω δ	+0.3		-0.6	+0.3		-0.6	+0.3		-0.6	+0.3		-0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♈ Aquarii. Mag. 4.4		♄ Cephei. Mag. 5.4		♋ Gruis. Mag. 2.2		♊ Pegasi. Mag. 4.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 2	° ' -14 15	h m 22 2	° ' +62 22	h m 22 3	° ' -47 21	h m 22 3	° ' +24 56
n. 1.1	0.859 44	64.06 13	29.76 27	86.35 218	4.325 92	38.48 144	11.615 72	50.34 166
11.1	0.815 15	64.19 1	29.49 21	84.17 258	4.233 50	37.04 177	11.543 44	48.68 182
21.1	0.800 12	64.20 13	29.28 13	81.59 285	4.183 6	35.27 202	11.499 13	46.86 190
31.1	0.812 41	64.07 30	29.15 7	78.74 305	4.177 39	33.25 223	11.486 20	44.96 190
b. 10.0	0.853 72	63.77 46	29.08 1	75.69 309	4.216 84	31.02 241	11.506 55	43.06 181
20.0	0.925 103	63.31 66	29.09 10	72.60 302	4.300 130	28.61 254	11.561 91	41.25 164
ar. 2.0	1.028 133	62.65 84	29.19 18	69.58 282	4.430 175	26.07 261	11.652 129	39.61 140
11.9	1.161 167	61.81 104	29.37 26	66.76 251	4.605 218	23.46 263	11.781 167	38.21 107
21.9	1.328 199	60.77 125	29.63 34	64.25 209	4.823 261	20.83 261	11.948 204	37.14 69
31.9	1.527 227	59.52 142	29.97 41	62.16 160	5.084 302	18.22 252	12.152 237	36.45 27
pr. 10.9	1.754 257	58.10 159	30.38 46	60.56 105	5.386 338	15.70 242	12.389 268	36.18 17
20.8	2.011 280	56.51 170	30.84 50	59.51 45	5.724 368	13.28 224	12.657 294	36.35 61
30.8	2.291 300	54.81 179	31.34 53	59.06 15	6.092 395	11.04 200	12.951 312	36.96 106
ay 10.8	2.591 313	53.02 183	31.87 55	59.21 75	6.487 412	9.04 174	13.263 325	38.01 144
20.8	2.904 319	51.19 183	32.42 54	59.96 132	6.899 420	7.30 143	13.588 329	39.45 182
30.7	3.223 318	49.36 176	32.96 53	61.28 186	7.319 419	5.87 108	13.917 325	41.27 213
ne 9.7	3.541 308	47.60 167	33.49 49	63.14 234	7.738 407	4.79 70	14.242 312	43.40 237
19.7	3.849 293	45.93 153	33.98 45	65.48 275	8.145 386	4.09 32	14.554 291	45.77 258
29.6	4.142 266	44.40 135	34.43 39	68.23 310	8.531 354	3.77 8	14.845 264	48.35 268
ly 9.6	4.408 236	43.05 113	34.82 32	71.33 336	8.885 312	3.85 46	15.109 230	51.03 275
19.6	4.644 198	41.92 91	35.14 25	74.69 355	9.197 261	4.31 83	15.339 189	53.78 274
29.6	4.842 156	41.01 65	35.39 18	78.24 366	9.458 206	5.14 116	15.528 146	56.52 267
ig. 8.5	4.998 111	40.36 42	35.57 10	81.90 370	9.664 143	6.30 144	15.674 100	59.19 255
18.5	5.109 66	39.94 17	35.67 2	85.60 365	9.807 81	7.74 167	15.774 54	61.74 239
28.5	5.175 21	39.77 3	35.69 6	89.25 352	9.888 17	9.41 182	15.828 9	64.13 219
pt. 7.5	5.196 21	39.80 23	35.63 13	92.77 334	9.905 46	11.23 189	15.837 33	66.32 192
17.4	5.175 58	40.03 38	35.50 20	96.11 307	9.859 100	13.12 189	15.804 70	68.24 166
27.4	5.117 89	40.41 50	35.30 26	99.18 274	9.759 149	15.01 181	15.734 101	69.90 136
t. 7.4	5.028 115	40.91 59	35.04 31	101.92 236	9.610 187	16.82 162	15.633 126	71.26 104
17.3	4.913 131	41.50 63	34.73 34	104.28 191	9.423 216	18.44 140	15.507 144	72.30 71
27.3	4.782 140	42.13 64	34.39 38	106.19 140	9.207 232	19.84 108	15.363 154	73.01 36
rv. 6.3	4.642 141	42.77 62	34.01 40	107.59 88	8.975 237	20.92 73	15.209 158	73.37 2
16.3	4.501 136	43.39 58	33.61 40	108.47 31	8.738 231	21.65 35	15.051 155	73.39 35
26.2	4.365 123	43.97 52	33.21 39	108.78 84	8.507 190	22.00 45	14.896 131	73.04 68
c. 6.2	4.242 106	44.49 43	32.82 38	108.51 191	8.294 157	21.94 122	14.750 91	72.36 100
16.2	4.136 87	44.92 35	32.44 34	107.67 142	8.104 120	21.49 85	14.619 112	71.36 130
26.2	4.049 61	45.27 21	32.10 31	106.25 191	7.947 120	20.64 122	14.507 91	70.06 156
36.1	3.988	45.48	31.79	104.34	7.827	19.42	14.416	68.50
Place	0.605	65.01	30.944	66.71	4.269	32.11	11.569	38.71
δ, Tan δ	1.032	-0.254	2.158	+1.912	1.476	-1.086	1.103	+0.465
, D _∞ α	+0.06	+0.01	+0.04	-0.11	+0.08	+0.06	+0.05	-0.03
, D _∞ δ	+0.3	-0.5	+0.3	-0.5	+0.3	-0.5	+0.3	-0.5

APPARENT PLACES OF STARS; 1918.
FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	3 Lacertæ. Mag. 4.6		π Aquarii. Mag. 4.6		σ Aquarii. Mag. 4.9		α Lacertæ. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 20 s	° ' " +51 48 "	h m 22 21 s	° ' " + 0 57 "	h m 22 26 s	° ' " -11 5 "	h m 22 27 s	° ' " +49 51 "
Jan. 1.2	19.595 ¹⁸⁶	83.15 ¹⁹⁸	5.669 ⁵⁸	44.22 ⁷⁹	18.928 ⁵⁹	50.66 ³⁰	54.413 ¹⁷⁸	56.65 ¹⁸⁸
11.1	19.409 ¹⁴⁸	81.17 ²³⁴	5.611 ³⁴	43.43 ⁷⁶	18.869 ³⁷	50.96 ¹⁷	54.235 ¹⁴⁴	54.77 ²²⁶
21.1	19.261 ¹⁰¹	78.83 ²⁶³	5.577 ¹⁰	42.67 ⁶⁹	18.832 ¹¹	51.13 ⁴	54.091 ¹⁰²	52.51 ²⁵³
31.1	19.160 ⁴⁹	76.20 ²⁷⁸	5.567 ¹⁹	41.98 ⁶⁰	18.821 ¹⁷	51.17 ¹²	53.989 ⁵⁴	49.98 ²⁰⁹
Feb. 10.0	19.111 ⁶	73.42 ²⁸³	5.586 ⁴⁶	41.38 ⁴⁵	18.838 ⁴⁴	51.05 ³⁰	53.935 ¹	47.29 ³⁷⁶
20.0	19.117 ⁶⁶	70.59 ²⁷⁷	5.632 ⁷⁸	40.93 ²⁶	18.882 ⁷⁶	50.75 ⁴⁸	53.936 ⁵⁵	44.53 ²⁰⁹
Mar. 2.0	19.183 ¹²⁶	67.82 ²⁵⁷	5.710 ¹¹⁰	40.67 ⁴	18.958 ¹⁰⁸	50.27 ⁷⁰	53.991 ¹¹⁴	41.84 ²⁵³
12.0	19.309 ¹⁸⁹	65.25 ²²⁹	5.820 ¹⁴²	40.63 ²²	19.066 ¹⁴⁰	49.57 ⁹²	54.105 ¹⁷³	39.32 ²²⁸
21.9	19.498 ²⁴⁷	62.96 ¹⁹⁰	5.962 ¹⁷⁷	40.85 ⁴⁹	19.206 ¹⁷⁴	48.65 ¹¹⁴	54.278 ²³⁰	37.09 ¹⁸⁸
31.9	19.745 ³⁰⁰	61.06 ¹⁴⁴	6.139 ²⁰⁸	41.34 ⁷⁸	19.380 ²⁰⁷	47.51 ¹⁸³	54.508 ²⁸³	35.21 ¹⁶²
Apr. 10.9	20.045 ³⁴⁷	59.62 ⁹¹	6.347 ²³⁷	42.12 ¹⁰⁶	19.587 ²³⁷	46.18 ¹⁵²	54.791 ³³⁰	33.79 ⁹⁰
20.9	20.392 ³⁸⁶	58.71 ³⁶	6.584 ²⁶⁵	43.18 ¹³¹	19.824 ²⁶⁵	44.66 ¹⁷⁰	55.121 ³⁶⁸	32.89 ³⁷
30.8	20.778 ⁴¹³	58.35 ²¹	6.849 ²⁸⁶	44.49 ¹⁵⁵	20.089 ²⁸⁶	42.96 ¹⁸⁰	55.489 ³⁹⁸	32.52 ¹⁹
May 10.8	21.191 ⁴³⁰	58.56 ⁷⁷	7.135 ³⁰²	46.04 ¹⁷⁴	20.375 ³⁰⁵	41.16 ¹⁸⁹	55.887 ⁴¹⁶	32.71 ⁷⁴
20.8	21.621 ⁴³⁶	59.33 ¹³¹	7.437 ³⁰⁹	47.78 ¹⁹⁰	20.680 ³¹⁴	39.27 ¹⁹³	56.303 ⁴²³	33.45 ¹²⁷
30.7	22.057 ⁴³⁰	60.64 ¹⁸¹	7.746 ³¹¹	49.68 ¹⁹⁹	20.994 ³¹⁷	37.34 ¹⁹⁰	56.726 ⁴²⁰	34.72 ¹⁷⁷
June 9.7	22.487 ⁴¹²	62.45 ²²⁵	8.057 ³⁰⁴	51.67 ²⁰⁴	21.311 ³¹²	35.44 ¹⁸³	57.146 ⁴⁰⁴	36.49 ²²¹
19.7	22.899 ³⁸²	64.70 ²⁶⁵	8.361 ²⁹⁰	53.71 ²⁰³	21.623 ²⁹⁷	33.61 ¹⁷¹	57.550 ³⁸⁰	38.70 ²⁵⁹
29.7	23.281 ³⁴⁴	67.35 ²⁹⁶	8.651 ²⁶⁷	55.74 ¹⁹⁷	21.920 ²⁷⁸	31.90 ¹⁵⁶	57.930 ³⁴⁵	41.29 ²⁸⁹
July 9.6	23.625 ²⁹⁸	70.31 ³²⁰	8.918 ²³⁹	57.71 ¹⁸⁷	22.198 ²⁴⁹	30.34 ¹³⁷	58.275 ³⁰⁰	44.18 ³¹⁶
19.6	23.923 ²⁴⁵	73.51 ³³⁷	9.157 ²⁰³	59.58 ¹⁷³	22.447 ²¹⁴	28.97 ¹¹⁴	58.575 ²⁵⁰	47.34 ³³¹
29.6	24.168 ¹⁸⁶	76.88 ³⁴⁶	9.360 ¹⁶⁵	61.31 ¹⁵³	22.661 ¹⁷⁵	27.83 ⁹⁰	58.825 ¹⁹⁵	50.65 ³⁴¹
Aug. 8.6	24.354 ¹²⁷	80.34 ³⁴⁹	9.525 ¹²³	62.84 ¹³³	22.836 ¹³³	26.93 ⁶⁴	59.020 ¹³⁶	54.06 ³⁴⁴
18.5	24.481 ⁶⁴	83.83 ³⁴³	9.648 ⁸⁰	64.17 ¹¹⁰	22.969 ⁸⁹	26.29 ⁴¹	59.156 ⁷⁸	57.50 ³³⁸
28.5	24.545 ⁵	87.26 ³³⁰	9.728 ³⁷	65.27 ⁸⁹	23.058 ⁴⁶	25.88 ¹⁶	59.234 ²⁰	60.88 ³²⁷
Sept. 7.5	24.550 ⁵⁴	90.56 ³¹²	9.765 ²	66.16 ⁶⁵	23.104 ³	25.72 ⁵	59.254 ³⁵	64.15 ³⁰⁶
17.4	24.496 ¹⁰⁶	93.68 ²⁸⁶	9.763 ⁴⁰	66.81 ⁴³	23.107 ³⁶	25.77 ²⁵	59.219 ⁸⁷	67.23 ²⁸⁴
27.4	24.390 ¹⁵³	96.54 ²⁵⁵	9.723 ⁷¹	67.24 ²²	23.071 ⁶⁹	26.02 ³⁹	59.132 ¹³²	70.07 ²⁵³
Oct. 7.4	24.237 ¹⁹⁰	99.09 ²¹⁹	9.652 ⁹⁵	67.46 ³	23.002 ⁹⁴	26.41 ⁵¹	59.000 ¹⁷²	72.60 ²¹⁸
17.4	24.047 ²²⁵	101.28 ¹⁷⁷	9.557 ¹¹⁵	67.49 ¹³	22.908 ¹¹⁵	26.92 ⁵⁹	58.828 ²⁰³	74.78 ¹⁷⁸
27.3	23.822 ²⁴⁷	103.05 ¹³²	9.442 ¹²⁵	67.36 ³⁰	22.793 ¹²⁷	27.51 ⁶⁴	58.625 ²²⁵	76.56 ¹³³
Nov. 6.3	23.575 ²⁶³	104.37 ⁸¹	9.317 ¹²⁹	67.06 ⁴³	22.666 ¹³²	28.15 ⁶⁶	58.400 ²⁴²	77.89 ⁸⁶
16.3	23.312 ²⁶⁷	105.18 ³⁰	9.188 ¹²⁸	66.63 ⁵⁵	22.534 ¹³¹	28.81 ⁶⁵	58.158 ²⁴⁸	78.75 ³⁴
26.3	23.045 ²⁶⁶	105.48 ²³	9.060 ¹²⁰	66.08 ⁶⁴	22.403 ¹²⁴	29.46 ⁶¹	57.910 ²⁴⁹	79.09 ¹⁷
Dec. 6.2	22.779 ²⁵⁵	105.25 ⁷⁶	8.940 ¹⁰⁸	65.44 ⁷²	22.279 ¹¹¹	30.07 ⁵⁵	57.661 ²⁴⁰	78.92 ⁶⁹
16.2	22.524 ²³⁸	104.49 ¹²⁸	8.832 ⁹³	64.72 ⁷⁷	22.168 ⁹⁶	30.62 ⁴⁷	57.421 ²²⁴	78.23 ¹¹⁹
26.2	22.286 ²⁰⁷	103.21 ¹⁷⁴	8.739 ⁷³	63.95 ⁸¹	22.072 ⁷⁶	31.09 ³⁹	57.197 ²⁰⁰	77.04 ¹⁶⁶
36.1	22.079	101.47	8.666	63.14	21.996	31.48	56.997	75.38
Mean Place	19.992	64.36	5.355	38.90	18.567	52.50	54.668	37.89
Sec δ, Tan δ	1.618	+1.272	1.000	+0.017	1.019	-0.196	1.551	+1.186
Dψ α, Dα α	+0.05	-0.08	+0.06	0.00	+0.06	+0.01	+0.05	-0.07
Dψ δ, Dα δ	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♈ Aquarii. Mag. 5.3		226 B. Cephei. Mag. 5.7		♐ Aquarii. Mag. 4.1		10 Lacertæ. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 30 s	° ' -21 7 "	h m 22 30 s	° ' +75 48 "	h m 22 31 s	° ' - 0 51 "	h m 22 35 s	° ' +38 37 "
Jan. 1.2	12.957	44.69	47.79	36.60	8.954	80.80	34.864	39.60
11.1	12.891 ⁶⁶	44.57 ¹²	47.13 ⁶⁶	34.86 ¹⁷⁴	8.892 ⁶²	81.51 ⁷¹	34.733 ¹³¹	37.88 ¹⁷²
21.1	12.847 ⁴⁴	44.25 ³²	46.56 ⁵⁷	32.61 ²²⁵	8.850 ⁴²	82.19 ⁶⁸	34.630 ¹⁰³	35.86 ²⁰²
31.1	12.832 ¹⁵	43.73 ⁵²	46.11 ⁴⁵	29.96 ²⁶⁵	8.832 ¹⁸	82.80 ⁶¹	34.559 ⁷¹	33.65 ²²¹
Feb. 10.1	12.845 ¹³	43.01 ⁷²	45.81 ³⁰	27.02 ²⁹⁴	8.840 ⁸	83.30 ⁵⁰	34.525 ³⁴	31.32 ²³³
20.0	12.888 ⁴³	42.10 ⁹¹	45.66 ¹⁵	23.88 ³¹⁴	8.878 ³⁸	83.66 ³⁶	34.532 ⁷	28.96 ²³⁶
Mar. 2.0	12.961 ⁷³	40.98 ¹¹²	45.67 ¹	20.70 ³¹⁸	8.946 ⁶⁸	83.81 ¹⁵	34.583 ⁵¹	26.69 ²²⁷
12.0	13.070 ¹⁰⁹	39.68 ¹³⁰	45.86 ¹⁹	17.60 ³¹⁰	9.045 ⁹⁹	83.76 ⁵	34.680 ⁹⁷	24.61 ²⁰⁸
21.9	13.212 ¹⁴²	38.20 ¹⁴⁸	46.20 ³⁴	14.70 ²⁶⁰	9.179 ¹³⁴	83.45 ³¹	34.824 ¹⁴⁴	22.80 ¹⁸¹
31.9	13.389 ¹⁷⁷	36.55 ¹⁶⁵	46.69 ⁴⁹	12.12 ²⁵⁸	9.346 ¹⁶⁷	82.87 ⁵⁸	35.016 ¹⁹²	21.35 ¹⁴⁵
Apr. 10.9	13.600 ²¹¹	34.78 ¹⁷⁷	47.32 ⁶³	9.96 ²¹⁶	9.547 ²⁰¹	82.03 ⁸⁴	35.251 ²³⁵	20.33 ¹⁰²
20.9	13.843 ²⁴³	32.88 ¹⁹⁰	48.08 ⁷⁶	8.30 ¹⁶⁶	9.778 ²³¹	80.91 ¹¹²	35.528 ²⁷⁷	19.77 ⁵⁶
30.8	14.114 ²⁷¹	30.91 ¹⁹⁷	48.92 ⁸⁴	7.19 ¹¹¹	10.038 ²⁶⁰	79.55 ¹³⁶	35.840 ³¹²	19.72 ⁵
May 10.8	14.410 ²⁹⁶	28.91 ²⁰⁰	49.83 ⁹¹	6.68 ⁵¹	10.320 ²⁸²	77.96 ¹⁵⁹	36.178 ³³⁸	20.16 ⁴⁴
20.8	14.724 ³¹⁴	26.93 ¹⁹⁸	50.78 ⁹⁵	6.76 ⁸	10.620 ³⁰⁰	76.20 ¹⁷⁶	36.537 ³⁵⁹	21.12 ⁹⁶
30.8	15.049 ³²⁵	25.01 ¹⁹²	51.73 ⁹⁵	7.45 ⁶⁹	10.929 ³⁰⁹	74.30 ¹⁹⁰	36.904 ³⁶⁷	22.52 ¹⁴⁰
June 9.7	15.379 ³³⁰	23.20 ¹⁸¹	52.66 ⁹³	8.72 ¹²⁷	11.242 ³¹³	72.31 ¹⁹⁹	37.271 ³⁶⁷	24.36 ¹⁸⁴
19.7	15.705 ³²⁶	21.57 ¹⁶³	53.55 ⁸⁹	10.53 ¹⁸¹	11.548 ³⁰⁶	70.29 ²⁰²	37.628 ³⁵⁷	26.57 ²²¹
29.7	16.017 ³¹²	20.13 ¹⁴⁴	54.36 ⁸¹	12.83 ²³⁰	11.843 ²⁹⁵	68.28 ²⁰¹	37.967 ³³⁹	29.10 ²⁵³
July 9.6	16.309 ²⁹²	18.94 ¹¹⁹	55.08 ⁷²	15.56 ²⁷³	12.117 ²⁷⁴	66.35 ¹⁹³	38.278 ³¹¹	31.88 ²⁷⁸
19.6	16.572 ²⁶³	18.00 ⁹⁴	55.71 ⁶³	18.66 ³¹⁰	12.363 ²⁴⁶	64.53 ¹⁸²	38.553 ²⁷⁵	34.83 ²⁹⁵
29.6	16.800 ²²⁸	17.36 ⁶⁴	56.21 ⁵⁰	22.04 ³³⁸	12.575 ²¹²	62.88 ¹⁶⁵	38.788 ²³⁵	37.91 ³⁰⁸
Aug. 8.6	16.988 ¹⁸⁸	17.01 ³⁵	56.57 ³⁶	25.65 ³⁶¹	12.749 ¹⁷⁴	61.41 ¹⁴⁷	38.977 ¹⁸⁹	41.02 ³¹¹
18.5	17.132 ¹⁴⁴	16.93 ⁸	56.80 ²³	29.39 ³⁷⁴	12.881 ¹³²	60.16 ¹²⁵	39.116 ¹³⁹	44.12 ³¹⁰
28.5	17.229 ⁹⁷	17.13 ²⁰	56.89 ⁹	33.18 ³⁷⁹	12.971 ⁹⁰	59.12 ¹⁰⁴	39.205 ⁸⁹	47.12 ³⁰⁰
Sept. 7.5	17.278 ⁴⁹	17.56 ⁴³	56.85 ⁴	36.96 ³⁷⁸	13.020 ⁴⁹	58.33 ⁷⁹	39.245 ⁴⁰	49.98 ²⁸⁶
17.4	17.285 ⁷	18.20 ⁶⁴	56.66 ¹⁹	40.64 ³⁶⁸	13.027 ⁷	57.76 ⁵⁷	39.236 ⁹	52.64 ²⁶⁶
27.4	17.250 ³⁵	18.99 ⁷⁹	56.35 ³¹	44.14 ³⁵⁰	12.997 ³⁰	57.40 ³⁶	39.186 ⁵⁰	55.06 ²⁴²
Oct. 7.4	17.179 ⁷¹	19.89 ⁹⁰	55.92 ⁴³	47.40 ³²⁶	12.934 ⁶³	57.26 ¹⁴	39.095 ⁹¹	57.18 ²¹²
17.4	17.080 ⁹⁹	20.84 ⁹⁵	55.39 ⁵³	50.33 ²⁹³	12.847 ⁸⁷	57.30 ⁴	38.972 ¹²³	58.97 ¹⁷⁹
27.3	16.957 ¹²³	21.80 ⁹⁶	54.75 ⁶⁴	52.87 ²⁵⁴	12.740 ¹⁰⁷	57.51 ²¹	38.824 ¹⁴⁸	60.40 ¹⁴³
Nov. 6.3	16.821 ¹³⁶	22.71 ⁹¹	54.04 ⁷¹	54.95 ²⁰⁸	12.619 ¹²¹	57.85 ³⁴	38.655 ¹⁶⁹	61.41 ¹⁰¹
16.3	16.679 ¹⁴²	23.54 ⁸³	53.27 ⁷⁷	56.52 ¹⁵⁷	12.494 ¹²⁵	58.31 ⁴⁶	38.475 ¹⁸⁰	62.02 ⁶¹
26.3	16.537 ¹⁴²	24.24 ⁷⁰	52.47 ⁸⁰	57.52 ¹⁰⁰	12.368 ¹²⁶	58.87 ⁵⁶	38.290 ¹⁸⁵	62.17 ¹⁵
Dec. 6.2	16.402 ¹³⁵	24.80 ⁵⁶	51.65 ⁸²	57.91 ³⁹	12.249 ¹¹⁹	59.50 ⁶³	38.104 ¹⁸⁶	61.89 ²⁸
16.2	16.281 ¹²¹	25.19 ³⁹	50.83 ⁸²	57.70 ²¹	12.138 ¹¹¹	60.21 ⁷¹	37.926 ¹⁷⁸	61.17 ⁷²
26.2	16.175 ¹⁰⁶	25.40 ²¹	50.05 ⁷⁸	56.87 ⁸³	12.042 ⁹⁶	60.94 ⁷³	37.761 ¹⁶⁵	60.02 ¹¹⁵
36.1	16.090 ⁸⁵	25.42 ²	49.33 ⁷²	55.43 ¹⁴⁴	11.964 ⁷⁸	61.69 ⁷⁵	37.614 ¹⁴⁷	58.49 ¹⁵³
Mean Place	12.584	43.72	50.296	13.56	8.587	85.79	34.792	23.13
Sec δ, Tan δ	1.072	-0.386	4.079	+3.955	1.000	-0.009	1.280	+0.799
D _α α, D _α α	+0.06	+0.02	+0.02	-0.24	+0.06	0.00	+0.05	-0.05
D _δ δ, D _δ δ	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Piscis Australis. Mag. 4.2			ζ Pegasi. Mag. 3.6			β Gruis. Mag. 2.2			η Pegasi. Mag. 3.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	22	36	−27 27	22	37	+10 24	22	37	−47 18	22	39	+29 47
	s		"	s		"	s		"	s		"
Jan. 1.2	7.751		81.50	22.676		18.83	46.869		57.48	9.596		45.04
11.1	7.673	78	81.12 38	22.604	72	17.76 107	46.737	132	56.25 123	9.490	106	43.49 155
21.1	7.618	55	80.49 63	22.550	54	16.63 113	46.640	97	54.66 159	9.409	81	41.72 177
31.1	7.593	25	79.63 86	22.522	28	15.49 114	46.584	56	52.77 189	9.354	55	39.80 192
Feb. 10.1	7.596	3	78.54 109	22.519	3	14.40 109	46.569	15	50.58 219	9.331	23	37.81 199
		36			27			28			11	
20.0	7.632		77.24	22.546		13.41	46.597		48.17	9.342		35.83
Mar. 2.0	7.702	70	75.74 150	22.604	58	12.59 82	46.670	73	45.58 259	9.392	50	33.96 187
12.0	7.807	105	74.05 169	22.696	92	12.00 59	46.789	119	42.86 272	9.483	91	32.29 167
21.9	7.946	139	72.21 184	22.824	128	11.67 33	46.954	165	40.07 279	9.616	133	30.89 140
31.9	8.122	176	70.23 198	22.987	163	11.64 3	47.166	212	37.25 282	9.791	175	29.85 104
		213			198			256			216	
Apr. 10.9	8.335		68.15	23.185		11.94	47.422		34.46	10.007		29.20
20.9	8.581	246	66.01 214	23.416	231	12.59 65	47.721	299	31.77 269	10.260	253	28.99 21
30.8	8.857	276	63.85 216	23.676	260	13.55 96	48.059	338	29.22 255	10.544	284	29.23 24
May 10.8	9.160	303	61.71 214	23.959	283	14.84 129	48.427	368	26.87 235	10.856	312	29.93 70
20.8	9.482	322	59.66 205	24.261	302	16.42 158	48.821	394	24.77 210	11.186	330	31.06 113
		337			313			411			340	
30.8	9.819		57.73	24.574		18.23	49.232		22.98	11.526		32.60
June 9.7	10.160	341	55.96 177	24.889	315	20.23 200	49.649	417	21.53 145	11.868	342	34.49 189
19.7	10.498	338	54.43 153	25.200	311	22.38 215	50.064	415	20.46 107	12.204	336	36.71 222
29.7	10.825	327	53.15 128	25.497	297	24.61 223	50.463	399	19.80 66	12.523	319	39.16 245
July 9.6	11.130	305	52.17 98	25.774	277	26.86 225	50.839	376	19.56 24	12.818	295	41.82 266
		278			248			341			264	
19.6	11.408		51.49	26.022		29.09	51.180		19.74	13.082		44.58
29.6	11.649	241	51.14 35	26.238	216	31.22 213	51.477	297	20.33 59	13.308	226	47.41 283
Aug. 8.6	11.850	201	51.09 5	26.415	177	33.24 202	51.722	245	21.30 97	13.492	184	50.23 282
18.5	12.004	154	51.37 28	26.551	136	35.10 186	51.909	187	22.61 131	13.633	141	52.99 276
28.5	12.110	106	51.91 54	26.645	94	36.75 165	52.035	126	24.22 161	13.726	93	55.62 263
		57			51			c3			48	
Sept. 7.5	12.167		52.70	26.696		38.20	52.098		26.04	13.774		58.10
17.5	12.177	10	53.69 99	26.707	11	39.41 121	52.099	1	28.01 197	13.778	4	60.36 236
27.4	12.143	34	54.82 113	26.681	26	40.39 98	52.042	57	30.04 203	13.741	37	62.37 201
Oct. 7.4	12.071	72	56.03 121	26.622	59	41.11 72	51.932	110	32.05 201	13.669	72	64.09 172
17.4	11.968	103	57.25 122	26.538	84	41.61 50	51.778	154	33.94 189	13.569	100	65.52 143
		129			104			188			126	
27.3	11.839		58.43	26.434		41.86	51.590		35.63	13.443		66.60
Nov. 6.3	11.694	145	59.51 108	26.314	120	41.89 3	51.376	214	37.06 143	13.302	141	67.33 73
16.3	11.541	153	60.45 94	26.188	126	41.69 20	51.149	227	38.15 109	13.150	152	67.69 36
26.3	11.388	153	61.20 75	26.060	128	41.30 39	50.919	230	38.86 71	12.993	157	67.69 0
Dec. 6.2	11.240	148	61.74 54	25.936	124	40.71 59	50.695	224	39.15 29	12.838	155	67.31 38
		135			116			206			149	
16.2	11.105		62.03	25.820		39.94	50.489		39.03	12.689		66.55
26.2	10.988	117	62.08 5	25.716	104	39.02 92	50.303	186	38.48 55	12.552	137	65.45 110
36.2	10.890	98	61.87 21	25.628	88	37.98 104	50.148	155	37.53 95	12.431	121	64.05 140
Mean Place	7.368		78.80	22.317		10.41	46.634		50.23	9.375		30.83
Sec δ, Tan δ	1.127		−0.520	1.017		+0.184	1.475		−1.084	1.153		+0.572
Dψ α, Dω α	+0.07		+0.03	+0.06		−0.01	+0.07		+0.07	+0.06		−0.04
Dψ δ, Dω δ	+0.4		−0.4	+0.4		−0.4	+0.4		−0.4	+0.4		−0.3

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FOR THE UPPER TRANSIT AT WASHINGTON.

Right Ascension.	λ Pegasi. Mag. 4.1		Right Ascension.	ε Gruis. Mag. 3.7		Right Ascension.	τ Aquarii. Mag. 4.2		Right Ascension.	μ Pegasi. Mag. 3.7					
	Declina- tion.			Declina- tion.			Declina- tion.			Declina- tion.					
	h	m		°	'		h	m		°	'	h	m	°	'
22	42	+23	8	22	43	-51	44	22	45	-14	1	22	46	+24	10
s	"		s	"		s	"		s	"		s	"		
1.2	35.078	94	14.07	36.671	160	62.09	138	15.589	73	31.49	19	2.965	97	18.56	138
11.1	34.984	71	12.68	36.511	121	60.73	176	15.516	52	31.68	5	2.868	75	17.18	157
21.1	34.913	49	11.12	36.390	79	58.97	209	15.464	28	31.73	11	2.793	51	15.61	168
31.1	34.864	16	9.45	36.311	33	56.88	238	15.436	4	31.62	30	2.742	22	13.93	174
b. 10.1	34.848	14	7.75	36.278	15	54.50	262	15.432	26	31.32	50	2.720	11	12.19	168
20.0	34.862	48	6.11	36.293	64	51.88	280	15.458	56	30.82	68	2.731	44	10.51	157
r. 2.0	34.910	87	4.58	36.357	115	49.08	293	15.514	88	30.14	89	2.775	84	8.94	138
12.0	34.997	126	3.25	36.472	166	46.15	299	15.602	122	29.25	112	2.859	123	7.56	110
21.9	35.123	165	2.21	36.638	216	43.16	299	15.724	158	28.13	131	2.982	163	6.46	78
31.9	35.288	204	1.49	36.854	266	40.17	295	15.882	190	26.82	150	3.145	201	5.68	41
r. 10.9	35.492	239	1.15	37.120	313	37.22	283	16.072	223	25.32	109	3.346	237	5.27	1
20.9	35.731	271	1.21	37.433	354	34.39	265	16.297	255	23.63	181	3.583	271	5.26	41
30.8	36.002	297	1.68	37.787	391	31.74	243	16.552	279	21.82	192	3.854	297	5.67	83
y 10.8	36.299	315	2.56	38.178	417	29.31	214	16.831	301	19.90	197	4.151	315	6.50	123
20.8	36.614	327	3.84	38.595	437	27.17	180	17.132	314	17.93	199	4.466	328	7.73	159
30.8	36.941	330	5.47	39.032	448	25.37	143	17.446	320	15.94	194	4.794	333	9.32	190
ne 9.7	37.271	325	7.39	39.480	444	23.94	102	17.766	317	14.00	185	5.127	327	11.22	217
19.7	37.596	309	9.59	39.924	431	22.92	58	18.083	307	12.15	170	5.454	312	13.39	238
29.7	37.905	289	11.97	40.355	405	22.34	13	18.390	290	10.45	152	5.766	293	15.77	254
ly 9.6	38.194	259	14.49	40.760	370	22.21	31	18.680	263	8.93	131	6.059	263	18.31	261
19.6	38.453	224	17.10	41.130	323	22.52	75	18.943	232	7.62	105	6.322	228	20.92	263
29.6	38.677	185	19.71	41.453	269	23.27	115	19.175	193	6.57	78	6.550	189	23.55	260
g. 8.6	38.862	142	22.27	41.722	208	24.42	150	19.368	152	5.79	52	6.739	146	26.15	251
18.5	39.004	97	24.74	41.930	140	25.92	179	19.520	108	5.27	25	6.885	102	28.66	238
28.5	39.101	53	27.07	42.070	73	27.71	202	19.628	64	5.02	0	6.987	57	31.04	219
pt. 7.5	39.154	12	29.21	42.143	4	29.73	218	19.692	21	5.02	23	7.044	15	33.23	199
17.5	39.166	27	31.14	42.147	59	31.91	222	19.713	18	5.25	41	7.059	24	35.22	174
27.4	39.139	61	32.81	42.088	118	34.13	218	19.695	52	5.66	58	7.035	58	36.96	147
t. 7.4	39.078	89	34.23	41.970	168	36.31	204	19.643	83	6.24	69	6.977	87	38.43	117
17.4	38.989	112	35.35	41.802	208	38.35	183	19.560	104	6.93	76	6.890	109	39.60	89
27.3	38.877	127	36.16	41.594	237	40.18	152	19.456	121	7.69	78	6.781	128	40.49	55
v. 6.3	38.750	138	36.68	41.357	256	41.70	116	19.335	128	8.47	77	6.653	137	41.04	23
16.3	38.612	141	36.86	41.101	260	42.86	74	19.207	130	9.24	72	6.516	142	41.27	10
26.3	38.471	140	36.72	40.841	255	43.60	30	19.077	127	9.96	65	6.374	141	41.17	41
c. 6.2	38.331	134	36.28	40.586	240	43.90	17	18.950	117	10.61	56	6.233	135	40.76	73
16.2	38.197	122	35.52	40.346	216	43.73	64	18.833	105	11.17	45	6.098	126	40.03	101
26.2	38.075	108	34.49	40.130	187	43.09	107	18.728	89	11.62	30	5.972	110	39.02	128
36.2	37.967		33.20	39.943		42.02		18.639		11.92		5.862		37.74	
Place	34.770	1.68	36.472	53.89	15.136	32.47	2.642	5.80							
Tan δ	1.087	+0.427	1.615	-1.268	1.031	-0.250	1.096	+0.449							
D _a	+0.06	-0.03	+0.07	+0.08	+0.06	+0.02	+0.06	-0.03							
D _δ	+0.4	-0.3	+0.4	-0.3	+0.4	-0.3	+0.4	-0.3							

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	α Piscis Australis. (Fomalhaut.) Mag. 1.3		σ Andromedæ. Mag. 3.6		β Pegasi. Var. 2.2-2.7		α Pegasi. (Markab.) Mag. 2.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 53	° ' -30 2	h m 22 58	° ' +41 53	h m 22 59	° ' +27 38	h m 23 0	° ' +14 45
	s	"	s	"	s	"	s	"
a. 1.2	7.824 96	89.54 40	8.881 155	24.11 156	48.200 110	29.88 136	40.964 91	59.93 110
11.1	7.728 72	89.14 69	8.726 133	22.55 188	48.090 92	28.52 160	40.873 72	58.83 123
21.1	7.656 46	88.45 95	8.593 102	20.67 216	47.998 68	26.92 173	40.801 52	57.61 126
31.1	7.610 16	87.50 121	8.491 66	18.51 232	47.930 40	25.19 182	40.749 27	56.35 126
b. 10.1	7.594 16	86.29 143	8.425 26	16.19 240	47.890 7	23.37 182	40.722 1	55.10 117
20.0	7.610 48	84.86 167	8.399 21	13.79 237	47.883 29	21.55 172	40.723 34	53.93 106
r. 2.0	7.658 85	83.19 184	8.420 69	11.42 223	47.912 68	19.83 156	40.757 68	52.88 86
12.0	7.743 123	81.35 202	8.489 121	9.19 200	47.980 110	18.27 130	40.825 105	52.02 59
22.0	7.866 161	79.33 215	8.610 173	7.19 169	48.090 153	16.97 100	40.930 142	51.43 29
31.9	8.027 199	77.18 225	8.783 222	5.50 128	48.243 194	15.97 63	41.072 181	51.14 2
r. 10.9	8.226 235	74.93 230	9.005 268	4.22 84	48.437 233	15.34 21	41.253 217	51.16 38
20.9	8.461 270	72.63 232	9.273 308	3.38 36	48.670 268	15.13 20	41.470 250	51.54 74
30.8	8.731 299	70.31 227	9.581 342	3.02 15	48.938 298	15.33 64	41.720 277	52.28 108
y 10.8	9.030 322	68.04 218	9.923 364	3.17 66	49.236 320	15.97 106	41.997 299	53.36 139
20.8	9.352 338	65.86 203	10.287 380	3.83 114	49.556 334	17.03 144	42.296 314	54.75 168
30.8	9.690 347	63.83 184	10.667 385	4.97 160	49.890 340	18.47 180	42.610 320	56.43 192
ne 9.7	10.037 347	61.99 159	11.052 379	6.57 201	50.230 337	20.27 210	42.930 318	58.35 211
19.7	10.384 338	60.40 131	11.431 364	8.58 235	50.567 326	22.37 233	43.248 308	60.46 224
29.7	10.722 321	59.09 100	11.795 338	10.93 265	50.893 305	24.70 253	43.556 292	62.70 231
ly 9.7	11.043 293	58.09 66	12.133 305	13.58 288	51.198 278	27.23 265	43.848 265	65.01 233
19.6	11.336 259	57.43 31	12.438 266	16.46 305	51.476 243	29.88 271	44.113 235	67.34 229
29.6	11.595 219	57.12 2	12.704 221	19.51 312	51.719 204	32.59 270	44.348 198	69.63 220
g. 8.6	11.814 174	57.14 37	12.925 171	22.63 315	51.923 162	35.29 265	44.546 159	71.83 207
18.5	11.988 126	57.51 67	13.096 121	25.78 312	52.085 118	37.94 253	44.705 116	73.90 189
28.5	12.114 77	58.18 92	13.217 70	28.90 300	52.203 72	40.47 239	44.821 75	75.79 171
pt. 7.5	12.191 28	59.10 115	13.287 20	31.90 284	52.275 31	42.86 218	44.896 34	77.50 148
17.5	12.219 17	60.25 130	13.307 25	34.74 263	52.306 11	45.04 196	44.930 3	78.98 126
27.4	12.202 58	61.55 138	13.282 68	37.37 236	52.295 46	47.00 168	44.927 38	80.23 100
t. 7.4	12.144 92	62.93 141	13.214 106	39.73 205	52.249 77	48.68 141	44.889 67	81.23 74
17.4	12.052 121	64.34 137	13.109 134	41.78 171	52.172 102	50.09 109	44.822 89	81.97 50
27.4	11.931 140	65.71 125	12.975 159	43.49 131	52.070 122	51.18 76	44.733 106	82.47 24
v. 6.3	11.791 152	66.96 108	12.816 176	44.80 90	51.948 135	51.94 44	44.627 119	82.71 0
16.3	11.639 156	68.04 89	12.640 188	45.70 44	51.813 143	52.38 7	44.508 124	82.71 26
26.3	11.483 153	68.93 63	12.452 193	46.14 0	51.670 145	52.45 28	44.384 125	82.45 47
c. 6.2	11.330 145	69.56 36	12.259 192	46.14 47	51.525 143	52.17 61	44.259 122	81.98 69
16.2	11.185 131	69.92 9	12.067 184	45.67 92	51.382 136	51.56 93	44.137 113	81.29 88
26.2	11.054 112	70.01 21	11.883 171	44.75 134	51.246 123	50.63 124	44.024 102	80.41 104
36.2	10.942	69.80	11.712	43.41	51.123	49.39	43.922	79.37
Place	7.370	85.96	8.671	6.01	47.813	15.72	40.489	49.75
Tan δ	1.155	-0.579	1.343	+0.897	1.129	+0.524	1.034	+0.264
$D_{\alpha} \alpha$	+0.06	+0.04	+0.05	-0.06	+0.06	-0.03	+0.06	-0.02
$D_{\alpha} \delta$	+0.4	-0.3	+0.4	-0.3	+0.4	-0.3	+0.4	-0.3

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	55 Pegasi. Mag. 4.7			C ² Aquarii. Mag. 3.8			π Cephei. Mag. 4.6			ι Gruis. Mag. 4.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	23	2	+ 8 57	23	5	-21 36	23	5	+74 56	23	5	-45 40
	s		"	s		"	s		"	s		"
Jan. 1.2	52.873		66.72	5.119		65.47	15.79		63.16	43.737		95.74
11.2	52.787	86	65.76 96	5.027	92	65.45 2	15.11	68	61.83 133	43.585	152	94.81 98
21.1	52.719	68	64.76 100	4.955	72	65.18 27	14.51	60	59.96 187	43.462	123	93.48 133
31.1	52.670	49	63.76 100	4.904	51	64.70 48	14.00	51	57.61 235	43.371	91	91.78 170
Feb. 10.1	52.646	24	62.80 96	4.880	24	63.98 72	13.61	39	54.89 272	43.317	54	89.77 201
		2	86		2	93		24	208		13	227
20.0	52.648		61.94	4.882		63.05	13.37		51.91	43.304		87.50
Mar. 2.0	52.681	33	61.25 69	4.917	35	61.88 117	13.26	11	48.79 312	43.334	30	84.99 251
12.0	52.748	67	60.74 51	4.986	69	60.51 137	13.31	5	45.66 313	43.408	74	82.31 268
22.0	52.850	102	60.49 25	5.089	103	58.93 158	13.52	21	42.65 301	43.527	119	79.50 281
31.9	52.988	138	60.51 2	5.229	140	57.17 176	13.89	37	39.88 277	43.693	166	76.63 287
		176	34		178	191		50	243		213	288
Apr. 10.9	53.164		60.85	5.407		55.26	14.39		37.45	43.906		73.75
20.9	53.375	211	61.51 66	5.621	214	53.22 204	15.03	64	35.47 198	44.164	258	70.90 265
30.9	53.619	244	62.47 96	5.869	248	51.09 213	15.77	74	33.98 149	44.463	299	68.16 274
May 10.8	53.889	270	63.74 127	6.145	276	48.93 216	16.59	82	33.06 92	44.799	336	65.59 257
20.8	54.181	292	65.28 154	6.446	301	46.77 216	17.47	88	32.72 34	45.165	366	63.23 236
		309	176		318	209		91	25		388	207
30.8	54.490		67.04	6.764		44.68	18.38		32.97	45.553		61.16
June 9.7	54.805	315	68.99 195	7.092	328	42.70 198	19.29	91	33.81 84	45.955	402	59.41 175
19.7	55.119	314	71.09 210	7.422	330	40.87 183	20.18	89	35.21 140	46.359	404	58.01 140
29.7	55.424	305	73.26 217	7.745	323	39.27 160	21.03	85	37.13 192	46.756	397	57.03 96
July 9.7	55.713	289	75.45 219	8.052	307	37.90 137	21.80	77	39.52 239	47.137	381	56.47 56
		265	216		285	107		70	279		351	12
19.6	55.978		77.61	8.337		36.83 77	22.50		42.31	47.488		56.35
29.6	56.213	235	79.68 207	8.589	252	36.06 47	23.09	59	45.46 315	47.802	314	56.65 30
Aug. 8.6	56.412	199	81.63 195	8.806	217	35.59 14	23.58	49	48.88 342	48.071	269	57.37 72
18.6	56.572	160	83.42 179	8.981	175	35.45 17	23.94	36	52.50 362	48.288	217	58.48 111
28.5	56.691	119	85.01 159	9.113	132	35.62 42	24.18	24	56.24 374	48.447	159	59.92 144
		78	138		85			10	379		100	173
Sept. 7.5	56.769		86.39	9.198		36.04	24.28		60.03	48.547		61.65
17.5	56.806	37	87.53 114	9.239	41	36.72 68	24.25	8	63.79 376	48.586	39	63.57 192
27.4	56.807	1	88.45 92	9.239	0	37.58 86	24.11	14	67.44 365	48.568	18	65.61 204
Oct. 7.4	56.772	35	89.12 67	9.200	39	38.58 100	23.83	28	70.90 346	48.497	71	67.70 209
17.4	56.709	63	89.57 45	9.128	72	39.67 109	23.45	38	74.11 321	48.379	118	69.73 203
		84	22		98	112		47	286		157	198
27.4	56.625		89.79	9.030		40.79	22.98		76.97	48.222		71.61
Nov. 6.3	56.523	102	89.81 2	8.913	117	41.88 109	22.41	57	79.42 245	48.037	185	73.27 166
16.3	56.409	114	89.61 20	8.783	130	42.90 102	21.78	63	81.40 198	47.833	204	74.64 137
26.3	56.289	120	89.24 37	8.648	135	43.79 89	21.08	70	82.83 143	47.617	216	75.65 101
Dec. 6.3	56.168	121	88.70 54	8.512	136	44.52 73	20.35	73	83.70 87	47.401	216	76.26 61
		115	70		130	55		76	25		207	20
16.2	56.053		88.00	8.382		45.07	19.59		83.95	47.194		76.46
26.2	55.944	109	87.17 83	8.263	119	45.42 35	18.85	74	83.59 36	47.000	194	76.22 24
36.2	55.846	98	86.24 93	8.157	106	45.55 13	18.15	70	82.60 99	46.828	172	75.55 67
Mean Place	52.363		58.38	4.578		64.13	17.134		38.52	43.328		88.24
Sec δ, Tan δ	1.012		+0.158	1.076		-0.396	3.851		+3.719	1.432		-1.024
D _μ α, D _μ α	+0.06		-0.01	+0.06		+0.03	+0.04		-0.24	+0.07		+0.07
D _μ δ, D _μ δ	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Time.	59 Pegasi. Mag. 5.2		δ H ¹ . Cassiopeiæ. Mag. 5.6		φ Aquarii. Mag. 4.4		ψ Aquarii. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 7 s 23 7	° ' " + 8 16 " + 8 16	h m 23 9 s 23 9	° ' " +56 42 " +56 42	h m 23 10 s 23 10	° ' " - 6 29 " - 6 29	h m 23 11 s 23 11	° ' " - 9 31 " - 9 31
a. 1.2	36.287	36.87	19.786	77.75	5.136	25.37	36.397	62.03
11.2	36.200 ⁸⁷	35.94 ⁹³	19.532 ²⁵⁴	76.29 ¹⁴⁶	5.051 ⁸⁵	25.88 ⁵¹	36.311 ⁸⁶	62.44 ⁴¹
21.1	36.129 ⁷¹	34.98 ⁹⁶	19.307 ²²⁵	74.39 ¹⁹⁰	4.982 ⁶⁹	26.28 ⁴⁰	36.243 ⁶⁸	62.71 ²⁷
31.1	36.077 ⁵²	34.02 ⁹⁶	19.123 ¹⁸⁴	72.11 ²²⁸	4.933 ⁴⁹	26.56 ²⁸	36.193 ⁵⁰	62.84 ¹³
b. 10.1	36.050 ²⁷	33.10 ⁹²	18.989 ¹³⁴	69.53 ²⁵⁸	4.906 ²⁷	26.71 ¹⁵	36.166 ²⁷	62.81 ³
20.0	36.047 ³	32.29 ⁸¹	18.912 ⁷⁷	66.79 ²⁷⁴	4.905 ¹	26.67 ⁴	36.165 ¹	62.59 ²²
r. 2.0	36.076 ²⁹	31.64 ⁶⁵	18.900 ¹²	63.98 ²⁸¹	4.934 ²⁹	26.44 ²³	36.194 ²⁹	62.17 ⁴²
12.0	36.138 ⁶²	31.18 ⁴⁶	18.960 ⁶⁰	61.22 ²⁷⁶	4.995 ⁶¹	25.98 ⁴⁶	36.254 ⁶⁰	61.52 ⁶⁵
22.0	36.234 ⁹⁶	30.97 ²¹	19.091 ¹³¹	58.64 ²⁵⁸	5.089 ⁹⁴	25.31 ⁶⁷	36.347 ⁹³	60.66 ⁸⁶
31.9	36.368 ¹³⁴	31.02 ⁵	19.294 ²⁰³	56.33 ²³¹	5.221 ¹³²	24.38 ⁹³	36.478 ¹³¹	59.56 ¹¹⁰
r. 10.9	36.540 ¹⁷²	31.39 ³⁷	19.565 ²⁷¹	54.39 ¹⁹⁴	5.387 ¹⁶⁶	23.22 ¹¹⁶	36.645 ¹⁶⁷	58.24 ¹³²
20.9	36.747 ²⁰⁷	32.07 ⁶⁸	19.901 ³³⁶	52.91 ¹⁴⁸	5.591 ²⁰⁴	21.83 ¹³⁹	36.847 ²⁰²	56.72 ¹⁵²
30.9	36.986 ²³⁹	33.05 ⁹⁸	20.291 ³⁹⁰	51.92 ⁹⁹	5.826 ²³⁵	20.24 ¹⁵⁹	37.081 ²³⁴	55.01 ¹⁷¹
y 10.8	37.254 ²⁶⁸	34.34 ¹²⁹	20.725 ⁴³⁴	51.49 ⁴³	6.089 ²⁶³	18.50 ¹⁷⁴	37.346 ²⁶⁵	53.15 ¹⁸⁶
20.8	37.544 ²⁹⁰	35.89 ¹⁵⁵	21.192 ⁴⁶⁷	51.60 ¹¹	6.377 ²⁸⁸	16.62 ¹⁸⁸	37.633 ²⁸⁷	51.19 ¹⁹⁶
30.8	37.851 ³⁰⁷	37.65 ¹⁷⁶	21.680 ⁴⁸⁸	52.27 ⁶⁷	6.680 ³⁰³	14.64 ¹⁹⁸	37.939 ³⁰⁶	49.17 ²⁰²
ne 9.7	38.165 ³¹⁴	39.60 ¹⁹⁶	22.174 ⁴⁹⁴	53.47 ¹²⁰	6.993 ³¹³	12.63 ²⁰¹	38.254 ³¹⁵	47.15 ²⁰²
19.7	38.480 ³¹⁵	41.68 ²⁰⁶	22.661 ⁴⁸⁷	55.18 ¹⁷¹	7.307 ³¹⁴	10.62 ²⁰¹	38.571 ³¹⁷	45.17 ¹⁹⁸
29.7	38.786 ³⁰⁶	43.83 ²¹⁵	23.130 ⁴⁶⁹	57.33 ²¹⁵	7.615 ³⁰⁸	8.69 ¹⁹³	38.882 ³¹¹	43.28 ¹⁸⁹
ly 9.7	39.077 ²⁹¹	46.01 ²¹⁸	23.567 ⁴³⁷	59.89 ²⁵⁶	7.908 ²⁹³	6.89 ¹⁸⁰	39.178 ²⁹⁶	41.54 ¹⁷⁴
19.6	39.344 ²⁶⁷	48.14 ²¹³	23.963 ³⁹⁶	62.77 ²⁸⁸	8.179 ²⁷¹	5.24 ¹⁶⁵	39.453 ²⁷⁵	39.99 ¹⁵⁵
29.6	39.583 ²³⁹	50.19 ²⁰⁵	24.310 ³⁴⁷	65.93 ³¹⁶	8.422 ²⁴³	3.77 ¹⁴⁷	39.698 ²⁴⁵	38.65 ¹³⁴
g. 8.6	39.786 ²⁰³	52.12 ¹⁹³	24.600 ²⁹⁰	69.27 ³³⁴	8.629 ²⁰⁷	2.55 ¹²²	39.910 ²¹²	37.57 ¹⁰⁸
18.6	39.950 ¹⁶⁴	53.87 ¹⁷⁵	24.827 ²²⁷	72.73 ³⁴⁶	8.799 ¹⁷⁰	1.58 ⁹⁷	40.084 ¹⁷⁴	36.74 ⁸³
28.5	40.074 ¹²⁴	55.42 ¹⁵⁵	24.992 ¹⁶⁵	76.26 ³⁵³	8.928 ¹²⁹	0.87 ⁷¹	40.216 ¹³²	36.19 ⁵⁵
pt. 7.5	40.156 ⁸²	56.77 ¹³⁵	25.089 ⁹⁷	79.74 ³⁴⁸	9.015 ⁸⁷	0.40 ⁴⁷	40.305 ⁸⁹	35.90 ²⁹
17.5	40.199 ⁴³	57.87 ¹¹⁰	25.125 ³⁶	83.14 ³⁴⁰	9.062 ⁴⁷	0.16 ²⁴	40.354 ⁴⁹	35.85 ⁵
27.4	40.204 ⁵	58.75 ⁸⁸	25.099 ²⁶	86.38 ³²⁴	9.069 ⁷	0.14 ²	40.363 ⁹	36.04 ¹⁹
t. 7.4	40.174 ²⁰	59.39 ⁶⁴	25.016 ⁸³	89.38 ³⁰⁰	9.043 ²⁶	0.35 ²¹	40.337 ²⁶	36.40 ³⁶
17.4	40.116 ⁵⁸	59.81 ⁴²	24.881 ¹³⁵	92.10 ²⁷²	8.986 ⁵⁷	0.73 ³⁸	40.281 ⁵⁶	36.92 ⁵²
27.4	40.035 ⁸¹	60.00 ¹⁹	24.702 ¹⁷⁹	94.47 ²³⁷	8.907 ⁷⁹	1.23 ⁵⁰	40.199 ⁸²	37.56 ⁶⁴
v. 6.3	39.936 ⁹⁹	59.99 ¹	24.484 ²¹⁸	96.42 ¹⁹⁵	8.806 ¹⁰¹	1.82 ⁵⁹	40.100 ⁹⁹	38.28 ⁷²
16.3	39.825 ¹¹¹	59.78 ²¹	24.235 ²⁴⁹	97.92 ¹⁵⁰	8.695 ¹¹¹	2.49 ⁶⁷	39.989 ¹¹¹	39.03 ⁷⁵
26.3	39.707 ¹¹⁸	59.40 ³⁸	23.965 ²⁷⁰	98.91 ⁹⁹	8.578 ¹¹⁷	3.18 ⁶⁹	39.869 ¹²⁰	39.78 ⁷⁵
c. 6.3	39.587 ¹²⁰	58.86 ⁵⁴	23.681 ²⁸⁴	99.37 ⁴⁶	8.459 ¹¹⁹	3.88 ⁷⁰	39.749 ¹²⁰	40.49 ⁷¹
16.2	39.472 ¹¹⁵	58.16 ⁷⁰	23.391 ²⁹⁰	99.28 ⁹	8.342 ¹¹⁷	4.57 ⁶⁹	39.634 ¹¹⁵	41.16 ⁶⁷
26.2	39.363 ¹⁰⁹	57.36 ⁸⁰	23.105 ²⁸⁶	98.65 ⁶³	8.236 ¹⁰⁶	5.22 ⁶⁵	39.525 ¹⁰⁹	41.76 ⁶⁰
36.2	39.264 ⁹⁹	56.46 ⁹⁰	22.883 ²⁷²	97.49 ¹¹⁶	8.138 ⁹⁸	5.81 ⁵⁹	39.427 ⁹⁸	42.25 ⁴⁹
Place	35.748	28.70	19.776	55.84	4.557	28.69	35.811	64.39
tan δ	1.011	+0.146	1.822	+1.523	1.006	-0.114	1.014	-0.168
D _α	+0.06	-0.01	+0.05	-0.10	+0.06	+0.01	+0.06	+0.01
D _δ	+0.4	-0.2	+0.4	-0.2	+0.4	-0.2	+0.4	-0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Tucane. Mag. 4.1			γ Piscium. Mag. 3.8			γ Sculptoris. Mag. 4.5			ο Cephei. Mag. 4.9		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	23	12	-58 40	23	12	+ 2 50	23	14	-32 58	23	15	+67 39
	s		"	s		"	s		"	s		"
Jan. 1.2	39.321		79.09	55.425		9.00	24.477		48.93	14.76		69.79
11.2	39.072	249	77.73 136	55.339	86	8.23 77	24.360	117	48.53 40	14.32	44	68.49 120
21.1	38.864	208	75.91 182	55.270	69	7.47 76	24.263	97	47.80 73	13.93	39	66.67 182
31.1	38.701	163	73.68 223	55.218	52	6.77 70	24.192	71	46.78 102	13.60	33	64.40 227
Feb. 10.1	38.590	111	71.10 258	55.190	28	6.15 62	24.147	45	45.46 132	13.34	26	61.77 283
		55	286		4	50		13	158		16	288
20.1	38.535		68.24	55.186		5.65	24.134		43.88	13.18		58.89
Mar. 2.0	38.538	3	65.15 309	55.212	26	5.32 33	24.156	22	42.06 182	13.10	8	55.88 301
12.0	38.601	63	61.91 324	55.270	58	5.20 12	24.214	58	40.03 203	13.13	3	52.87 301
22.0	38.726	125	58.59 332	55.362	92	5.32 12	24.310	96	37.82 221	13.27	14	49.97 200
31.9	38.915	189	55.26 333	55.492	130	5.69 37	24.448	138	35.48 234	13.52	25	47.31 266
		249	329		167	66		178	245		34	233
Apr. 10.9	39.164		51.97	55.659		6.35	24.626		33.03	13.86		44.98
20.9	39.473	309	48.80 317	55.860	201	7.28 93	24.845	219	30.53 250	14.30	44	43.09 189
30.9	39.836	363	45.83 297	56.094	234	8.49 121	25.100	255	28.03 250	14.81	51	41.71 138
May 10.8	40.247	411	43.10 273	56.358	264	9.94 145	25.388	288	25.58 245	15.39	58	40.85 86
20.8	40.699	452	40.68 242	56.645	287	11.62 168	25.705	317	23.24 234	16.01	62	40.57 28
		482	205		304	185		337	218		65	31
30.8	41.181		38.63	56.949		13.47	26.042		21.06	16.66		40.88
June 9.8	41.681	500	37.00 163	57.263	314	15.45 198	26.394	352	19.09 197	17.32	66	41.75 87
19.7	42.189	508	35.82 118	57.578	315	17.50 205	26.748	354	17.39 170	17.97	65	43.18 143
29.7	42.690	501	35.11 71	57.885	307	19.58 208	27.096	348	15.99 140	18.59	62	45.11 193
July 9.7	43.169	479	34.91 20	58.179	294	21.63 205	27.431	335	14.94 105	19.18	59	47.49 233
		447	29		273	198		311	68		52	277
19.6	43.616		35.20	58.452		23.61	27.742		14.26	19.70		50.26
29.6	44.017	401	35.98 78	58.694	242	25.46 185	28.022	280	13.96 30	20.16	46	53.37 311
Aug. 8.6	44.361	344	37.21 123	58.903	209	27.12 166	28.264	242	14.03 7	20.55	39	56.74 337
18.6	44.638	277	38.85 164	59.074	171	28.60 148	28.462	198	14.46 43	20.84	29	60.30 356
28.5	44.843	205	40.84 199	59.205	131	29.86 126	28.612	150	15.23 77	21.05	21	63.96 366
		125	228		90	103		100	107		12	370
Sept. 7.5	44.968		43.12	59.295		30.89	28.712		16.30	21.17		67.66
17.5	45.013	45	45.56 244	59.344	49	31.67 78	28.763	51	17.59 129	21.21	4	71.32 366
27.5	44.982	31	48.10 254	59.356	12	32.23 56	28.766	3	19.07 148	21.15	6	74.86 354
Oct. 7.4	44.876	106	50.63 253	59.333	23	32.57 34	28.726	40	20.66 159	21.00	15	78.22 336
17.4	44.705	171	53.04 241	59.282	51	32.69 12	28.647	79	22.28 162	20.79	21	81.30 308
		228	218		76	6		110	158		28	275
27.4	44.477		55.22	59.206		32.63	28.537		23.86	20.51		84.05
Nov. 6.3	44.205	272	57.11 189	59.113	93	32.39 24	28.403	134	25.33 147	20.17	34	86.41 236
16.3	43.901	304	58.59 148	59.007	106	32.01 38	28.253	150	26.62 129	19.78	39	88.30 189
26.3	43.579	322	59.62 103	58.894	113	31.51 50	28.094	159	27.68 106	19.35	43	89.66 136
Dec. 6.3	43.253	326	60.16 54	58.779	115	30.91 60	27.933	161	28.46 78	18.89	46	90.47 81
		320	0		112	69		157	48		47	22
16.2	42.933		60.16	58.667		30.22	27.776		28.94	18.42		90.69
26.2	42.631	302	59.64 52	58.560	107	29.47 75	27.628	148	29.09 15	17.94	48	90.32 37
36.2	42.358	273	58.61 103	58.463	97	28.68 79	27.496	132	28.92 17	17.49	45	89.34 98
Mean Place	39.069		69.08	54.841		2.59	23.928		44.30	15.123		45.75
Sec δ, Tan δ	1.924		-1.644	1.001		+0.050	1.192		-0.649	2.632		+2.434
Dψα, Dωα	+0.07		+0.11	+0.06		0.00	+0.06		+0.04	+0.05		-0.16
Dψδ, Dωδ	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	κ Piscium. Mag. 4.9			θ Piscium. Mag. 4.4			70 Pegasi. Mag. 4.7			β Sculptoris. Mag. 4.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h 23	m 22	° + 0 ' 48	h 23	m 23	° + 5 ' 55	h 23	m 25	° +12 ' 18	h 23	m 28	° -38 ' 15
	s		"	s		"	s		"	s		"
Jan. 1.2	44.376		29.54	49.100		50.02	1.004		38.64	35.279		85.69
11.2	44.285	91	28.82 72	49.006	94	49.19 83	0.905	99	37.68 96	35.137	142	85.21 48
21.1	44.209	76	28.15 67	48.926	80	48.34 85	0.820	85	36.63 105	35.016	121	84.35 86
31.1	44.149	60	27.54 61	48.865	61	47.51 83	0.753	67	35.55 108	34.919	97	83.13 122
Feb. 10.1	44.109	40	27.02 52	48.823	42	46.75 76	0.707	46	34.48 107	34.852	67	81.59 154
		13	38		16	65		20	100		36	183
20.1	44.096		26.64	48.807		46.10	0.687		33.48	34.816		79.76
Mar. 2.0	44.111	15	26.44 20	48.820	13	45.59 51	0.697	10	32.60 88	34.815	1	77.66 210
12.0	44.157	46	26.43 1	48.865	45	45.28 31	0.739	42	31.92 68	34.855	40	75.36 230
22.0	44.239	82	26.68 25	48.945	80	45.20 8	0.819	80	31.45 47	34.935	80	72.87 249
31.9	44.358	119	27.16 48	49.063	118	45.40 20	0.938	119	31.27 18	35.058	123	70.24 263
		156	76		156	46		158	12		168	271
Apr. 10.9	44.514		27.92	49.219		45.86	1.096		31.39	35.226		67.53
20.9	44.706	192	28.95 103	49.410	191	46.63 77	1.292	196	31.82 43	35.437	211	64.80 273
30.9	44.933	227	30.24 129	49.637	227	47.69 106	1.522	230	32.59 77	35.690	253	62.08 273
May 10.8	45.189	256	31.75 151	49.895	258	49.01 132	1.784	262	33.68 109	35.979	289	59.46 263
20.8	45.471	282	33.47 172	50.177	282	50.59 158	2.071	287	35.06 138	36.299	320	56.97 249
		301	188		302	178		306	165		345	230
30.8	45.772		35.35	50.479		52.37	2.377		36.71	36.644		54.67
June 9.8	46.083	311	37.33 198	50.790	311	54.30 193	2.694	317	38.57 186	37.006	362	52.64 203
19.7	46.398	315	39.38 206	51.105	315	56.35 205	3.013	319	40.61 204	37.376	370	50.91 173
29.7	46.706	308	41.43 205	51.414	309	58.46 211	3.327	314	42.77 216	37.743	367	49.53 138
July 9.7	47.002	296	43.44 201	51.711	297	60.56 210	3.627	300	44.98 221	38.098	355	48.53 100
		276	191		276	206		279	223		335	59
19.6	47.278		45.35	51.987		62.61	3.906		47.21	38.433		47.94 16
29.6	47.527	249	47.10 175	52.235	248	64.57 196	4.157	251	49.38 217	38.737	304	47.76 21
Aug. 8.6	47.742	215	48.69 159	52.451	216	66.39 182	4.375	218	51.46 208	39.003	266	48.00 63
18.6	47.920	178	50.07 138	52.629	178	68.02 163	4.555	180	53.41 195	39.224	221	48.63 90
28.5	48.060	140	51.22 115	52.769	140	69.46 144	4.697	142	55.18 177	39.397	173	49.62 132
		98	91		98	120		100	157		121	
Sept. 7.5	48.158		52.13	52.867		70.66	4.797		56.75	39.518		50.94
17.5	48.216	58	52.79 66	52.926	59	71.64 98	4.857	60	58.11 136	39.585	67	52.51 157
27.5	48.236	20	53.23 44	52.947	21	72.37 73	4.878	21	59.22 111	39.602	17	54.26 173
Oct. 7.4	48.222	14	53.43 20	52.934	13	72.89 52	4.866	12	60.11 89	39.571	31	56.13 157
17.4	48.177	45	53.44 1	52.891	43	73.17 28	4.824	42	60.75 64	39.497	74	58.02 189
		68	17		69	9		68	42		110	184
27.4	48.109		53.27	52.822		73.26	4.756		61.17	39.387		59.86
Nov. 6.3	48.021	88	52.95 32	52.735	87	73.16 10	4.668	88	61.35 18	39.249	138	61.55 169
16.3	47.920	101	52.51 44	52.634	101	72.89 27	4.566	102	61.32 3	39.089	160	63.04 149
26.3	47.810	110	51.95 56	52.524	110	72.47 42	4.454	112	61.07 25	38.916	173	64.25 121
Dec. 6.3	47.696	114	51.32 63	52.409	115	71.91 56	4.336	118	60.63 44	38.738	178	65.15 90
		114	70		115	67		117	62		177	52
16.2	47.582		50.62	52.294		71.24	4.219		60.01	38.561		65.67
26.2	47.473	109	49.89 73	52.184	110	70.48 76	4.104	115	59.23 78	38.393	168	65.82 15
36.2	47.372	101	49.15 74	52.080	104	69.65 83	3.996	108	58.31 92	38.237	156	65.59 23
Mean Place	43.734		23.75	48.460		42.50	0.371		28.95	34.680		79.54
Sec δ , Tan δ	1.000		+0.014	1.005		+0.104	1.024		+0.218	1.273		-0.789
$D\psi a, D_{\omega} a$	+0.06		0.00	+0.06		-0.01	+0.06		-0.01	+0.06		+0.05
$D\psi \delta, D_{\omega} \delta$	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2	+0.4		-0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	72 Pegasi (mean.) Mag. 5.2			λ Andromedæ. Mag. 4.0			ι Andromedæ. Mag. 4.3			ι Piscium. Mag. 4.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	23	29	+30 52	23	33	+46 0	23	34	+42 48	23	35	+ 5 10
	s		"	s		"	s		"	s		"
Jan. 1.2	53.490		37.46	33.255		69.79	7.138		69.76	44.622		61.61
11.2	53.359	131	36.25	33.064	191	68.55	6.963	175	68.53	44.525	97	60.80
21.1	53.242	117	34.80	32.890	174	66.92	6.803	160	66.94	44.439	88	59.98
31.1	53.144	98	33.13	32.741	149	64.97	6.666	137	65.04	44.370	69	59.19
Feb. 10.1	53.072	72	31.33	32.625	116	62.75	6.559	107	62.91	44.320	50	58.48
		42			77			69			27	
20.1	53.030		29.48	32.548		60.38	6.490		60.64	44.293		57.86
Mar. 2.0	53.024	6	27.66	32.518	30	57.95	6.464	26	58.33	44.294	1	57.39
12.0	53.058	34	25.96	32.540	22	55.56	6.487	23	56.07	44.328	34	57.13
22.0	53.136	78	24.45	32.618	78	53.32	6.563	76	53.99	44.398	70	57.08
Apr. 1.0	53.258	122	23.22	32.754	136	51.34	6.693	130	52.15	44.505	107	57.30
		169			192			184			145	
10.9	53.427		22.30	32.946		49.68	6.877		50.64	44.650		57.78
20.9	53.639	212	21.78	33.192	246	48.43	7.114	237	49.54	44.833	183	58.56
30.9	53.891	252	21.68	33.487	295	47.63	7.395	281	48.87	45.052	219	59.63
May 10.8	54.178	287	22.00	33.824	337	47.30	7.718	323	48.68	45.304	252	60.95
20.8	54.494	316	22.74	34.194	370	47.48	8.074	356	48.98	45.581	277	62.52
		335			395			377			299	
30.8	54.829		23.89	34.589		48.16	8.451		49.76	45.880		64.27
June 9.8	55.177	348	25.43	34.996	407	49.32	8.841	390	51.01	46.191	311	66.19
19.7	55.527	350	27.29	35.405	409	50.92	9.234	393	52.68	46.507	316	68.21
29.7	55.870	343	29.45	35.805	400	52.94	9.620	386	54.72	46.820	313	70.29
July 9.7	56.197	327	31.83	36.187	382	55.29	9.987	367	57.09	47.120	300	72.36
		304			353			339			284	
19.7	56.501		34.39	36.540		57.94	10.326		59.74	47.404		74.38
29.6	56.774	273	37.05	36.856	316	60.81	10.632	306	62.58	47.660	256	76.30
Aug. 8.6	57.012	238	39.76	37.131	275	63.85	10.896	264	65.56	47.885	225	78.07
18.6	57.208	196	42.46	37.357	226	66.97	11.116	220	68.62	48.075	190	79.65
28.5	57.361	153	45.10	37.533	176	70.12	11.287	171	71.68	48.226	151	81.04
		109			125			122			112	
Sept. 7.5	57.470		47.61	37.658		73.24	11.409		74.69	48.338		82.18
17.5	57.535	65	49.97	37.730	72	76.25	11.482	73	77.59	48.409	71	83.11
27.5	57.559	24	52.12	37.753	23	79.11	11.507	25	80.33	48.443	34	83.79
Oct. 7.4	57.545	14	54.04	37.730	23	81.75	11.488	19	82.84	48.443	0	84.25
17.4	57.497	48	55.69	37.664	66	84.14	11.429	59	85.10	48.412	31	84.48
		78			103			93			57	
27.4	57.419		57.05	37.561		86.20	11.336		87.04	48.355		84.52
Nov. 6.4	57.318	101	58.08	37.427	134	87.91	11.212	124	88.62	48.277	78	84.39
16.3	57.197	121	58.78	37.266	161	89.21	11.064	148	89.83	48.184	93	84.08
26.3	57.063	134	59.13	37.085	181	90.09	10.896	168	90.61	48.080	104	83.63
Dec. 6.3	56.920	143	59.13	36.888	197	90.51	10.715	181	90.95	47.970	110	83.05
		147			204			188			113	
16.2	56.773		58.76	36.684		90.45	10.527		90.85	47.857		82.38
26.2	56.627	146	58.05	36.478	206	89.92	10.337	190	90.29	47.747	110	81.63
36.2	56.486	141	57.01	36.276	202	88.93	10.151	186	89.30	47.641	106	80.82
Mean Place	52.900		21.72	32.758		49.71	6.603		50.48	43.910		54.27
Sec δ, Tan δ	1.165		+0.598	1.440		+1.036	1.364		+0.927	1.004		+0.091
D _ψ α, D _ω α	+0.06		-0.04	+0.06		-0.07	+0.06		-0.06	+0.06		-0.01
D _ψ δ, D _ω δ	+0.4		-0.1	+0.4		-0.1	+0.4		-0.1	+0.4		-0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ψ Andromedæ. Mag. 5.1		41 H. Cephei. Mag. 5.0		δ Sculptoris. Mag. 4.6		ϕ Pegasi. Mag. 5.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 41 s	° ' " +45 57 "	h m 23 43 s	° ' " +67 20 "	h m 23 44 s	° ' " -28 34 "	h m 23 48 s	° ' " +18 39 "
Jan. 1.2	58.515	73.80	59.03	88.68	40.097	66.74	19.598	65.40
11.2	58.321 194	72.66 114	58.59 44	87.73 95	39.971 126	66.68 6	19.485 113	64.43 97
21.2	58.141 180	71.11 155	58.17 42	86.24 149	39.860 111	66.30 38	19.381 104	63.31 112
31.1	57.985 156	69.24 187	57.81 36	84.26 198	39.767 93	65.62 68	19.291 90	62.08 123
Feb. 10.1	57.860 125 86	67.09 215 231	57.50 31 23	81.88 238 270	39.697 70 45	64.64 98 126	19.221 70 47	60.82 126 126
20.1	57.774 41	64.78 239	57.27 12	79.18 289	39.652 13	63.38 154	19.174 16	59.56 118
Mar. 2.0	57.733 10	62.39 236	57.15 4	76.29 297	39.639 21	61.84 175	19.158 18	58.38 104
12.0	57.743 66	60.03 224	57.11 7	73.32 293	39.660 58	60.09 199	19.176 56	57.34 85
22.0	57.809 123	57.79 199	57.18 17	70.39 276	39.718 98	58.10 218	19.232 98	56.49 59
Apr. 1.0	57.932 181	55.80 168	57.35 28	67.63 248	39.816 139	55.92 231	19.330 138	55.90 29
10.9	58.113 237	54.12 129	57.63 38	65.15 211	39.955 181	53.61 243	19.468 180	55.61 3
20.9	58.350 287	52.83 86	58.01 46	63.04 166	40.136 221	51.18 249	19.648 220	55.64 39
30.9	58.637 330	51.97 38	58.47 54	61.38 116	40.357 257	48.69 249	19.868 255	56.03 74
May 10.9	58.967 366 392	51.59 12 61	59.01 59 63	60.22 62 5	40.614 288 312	46.20 245 234	20.123 283 307	56.77 108 138
20.8	59.333	51.71	59.60	59.60	40.902	43.75	20.406	57.85
30.8	59.725	52.32	60.23	59.55	41.214	41.41	20.713	59.23
June 9.8	60.131 406	53.40 108	60.89 66	60.06 51	41.545 331	39.23 218	21.034 321	60.89 166
19.7	60.541 410	54.93 153	61.55 66	61.13 107	41.885 340	37.27 196	21.361 327	62.79 190
29.7	60.943 402	56.87 194	62.19 64	62.71 158	42.226 341	35.58 169	21.686 325	64.88 209
July 9.7	61.329 386 360	59.16 229 260	62.81 62 57	64.77 206 249	42.558 332 314	34.20 138 104	22.001 315 295	67.08 220 229
19.7	61.689 326	61.76 282	63.38 51	67.26 285	42.872 290	33.16 67	22.296 271	69.37 230
29.6	62.015 283	64.58 301	63.89 44	70.11 316	43.162 257	32.49 29	22.567 240	71.67 227
Aug. 8.6	62.298 237	67.59 309	64.33 36	73.27 337	43.419 218	32.20 8	22.807 203	73.94 219
18.6	62.535 188	70.68 313	64.69 29	76.64 356	43.637 175	32.28 44	23.010 165	76.13 205
28.6	62.723 136	73.81 311	64.98 20	80.20 363	43.812 130	32.72 77	23.175 125	78.18 190
Sept. 7.5	62.859 85	76.92 301	65.18 12	83.83 364	43.942 84	33.49 107	23.300 85	80.08 171
17.5	62.944 36	79.93 288	65.30 3	87.47 359	44.026 38	34.56 128	23.385 47	81.79 149
27.5	62.980 12	82.81 267	65.33 7	91.06 343	44.064 3	35.84 145	23.432 11	83.28 126
Oct. 7.4	62.968 53	85.48 242	65.26 13	94.49 325	44.061 42	37.29 155	23.443 21	84.54 103
17.4	62.915 91	87.90 212	65.13 21	97.74 294	44.019 75	38.84 158	23.422 49	85.57 77
27.4	62.824 125	90.02 177	64.92 27	100.68 260	43.944 101	40.42 152	23.373 72	86.34 52
Nov. 6.4	62.699 153	91.79 138	64.65 33	103.28 217	43.843 122	41.94 142	23.301 90	86.86 27
16.3	62.546 174	93.17 96	64.32 38	105.45 170	43.721 136	43.36 124	23.211 105	87.13 2
26.3	62.372 191	94.13 51	63.94 42	107.15 116	43.585 143	44.60 102	23.106 116	87.15 23
Dec. 6.3	62.181 201	94.64 4	63.52 44	108.31 59	43.442 146	45.62 74	22.990 120	86.92 46
16.3	61.980 205	94.68 44	63.08 46	108.90 1	43.296 143	46.36 47	22.870 123	86.46 69
26.2	61.775 204	94.24 90	62.62 46	108.89 60	43.153 135	46.83 15	22.747 119	85.77 88
36.2	61.571	93.34	62.16	108.29	43.018	46.98	22.628	84.89
Mean Place	57.931	53.57	58.822	63.88	39.368	63.01	18.829	53.38
Sec δ , Tan δ	1.439	+1.035	2.598	+2.397	1.139	-0.545	1.056	+0.338
D ψ α , D ω α	+0.06	-0.07	+0.06	-0.16	+0.06	+0.04	+0.06	-0.02
D ψ δ , D ω δ	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington on Time.	ε Tucanæ. Mag. 4.7		80 Piscium. Mag. 4.7		2 Ceti. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 55 s	° ' " -66 1 "	h m 23 57 s	° ' " - 6 27 "	h m 23 59 s	° ' " -17 47 "
a. 1.2	40.31	70.83	46.130	67.88	33.249	33.68
11.2	39.90 41	69.72 111	46.026 104	68.43 55	33.136 113	33.98 30
21.2	39.53 37	68.08 164	45.930 96	68.87 44	33.032 104	34.06 8
31.1	39.21 32	65.95 213	45.846 84	69.17 30	32.941 91	33.90 16
b. 10.1	38.94 27	63.39 256	45.780 66	69.31 14	32.868 73	33.50 40
	20	291	46	3	51	65
20.1	38.74	60.48	45.734	69.28	32.817	32.85
r. 2.1	38.61 13	57.26 322	45.716 18	69.04 24	32.793 24	31.97 88
12.0	38.56 5	53.82 344	45.727 11	68.59 45	32.801 8	30.83 114
22.0	38.59 3	50.25 357	45.772 45	67.91 68	32.842 41	29.47 136
r. 1.0	38.70 11	46.62 363	45.855 83	66.99 92	32.922 80	27.89 158
	18	362	121	117	120	179
10.9	38.88	43.00	45.976	65.82	33.042	26.10
20.9	39.15 27	39.49 351	46.136 160	64.44 138	33.201 159	24.14 196
30.9	39.51 36	36.13 336	46.334 198	62.84 160	33.400 199	22.03 211
iv 10.9	39.93 42	33.01 312	46.566 232	61.07 177	33.633 233	19.83 220
20.8	40.41 48	30.20 281	46.829 263	59.15 192	33.898 265	17.58 225
	54	244	287	202	291	226
30.8	40.95	27.76	47.116	57.13	34.189	15.32
ne 9.8	41.52 57	25.75 201	47.421 305	55.06 207	34.499 310	13.12 220
19.8	42.12 60	24.21 154	47.734 313	53.00 206	34.819 320	11.04 208
29.7	42.73 61	23.19 102	48.048 314	50.99 201	35.142 323	9.12 192
ly 9.7	43.33 60	22.70 49	48.354 306	49.09 190	35.459 317	7.42 170
	57	7	293	176	301	146
19.7	43.90	22.77	48.647	47.34	35.760	5.96
29.6	44.44 54	23.37 60	48.918 271	45.80 154	36.040 280	4.81 115
ig. 8.6	44.92 48	24.49 112	49.160 242	44.48 132	36.292 252	3.97 84
18.6	45.34 42	26.09 160	49.369 209	43.43 106	36.509 217	3.46 51
28.6	45.66 32	28.13 204	49.541 172	42.65 78	36.688 179	3.28 18
	24	238	132	51	139	14
pt. 7.5	45.90	30.51	49.673	42.14	36.827	3.42
17.5	46.03 13	33.16 265	49.767 94	41.91 28	36.923 96	3.85 43
27.5	46.07 4	35.98 282	49.822 55	41.92 1	36.978 55	4.54 69
t. 7.5	46.02 5	38.85 287	49.841 19	42.17 26	36.995 17	5.45 91
17.4	45.86 16	41.66 281	49.827 14	42.60 48	36.978 17	6.50 106
	23	263	41	58	48	116
27.4	45.63	44.29	49.786	43.18	36.930	7.66
iv. 6.4	45.32 31	46.66 237	49.721 65	43.88 70	36.856 74	8.86 120
16.3	44.95 37	48.63 197	49.637 84	44.64 76	36.763 93	10.03 117
26.3	44.54 41	50.15 152	49.540 97	45.44 80	36.655 108	11.14 111
sc. 6.3	44.11 43	51.15 100	49.433 107	46.25 81	36.536 119	12.14 100
	45	43	111	77	123	85
16.3	43.66	51.58	49.322	47.02	36.413	12.99
26.2	43.21 45	51.43 15	49.209 113	47.72 70	36.289 124	13.65 66
36.2	42.78 43	50.69 74	49.097 112	48.36 64	36.167 122	14.11 46
Place	39.879	58.99	45.291	71.20	32.414	33.19
l, Tan δ	2.462	-2.249	1.006	-0.113	1.050	-0.321
D. α	+0.06	+0.15	+0.06	+0.01	+0.06	+0.02
D. δ	+0.4	0.0	+0.4	0.0	+0.4	0.0

FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	S 1 Me
		h m s	s	° ' "	"	m s	s	' "	m s	h
Jan.	1	18 45 42.04	11.042	−23 2 3.5	+12.05	+ 3 32.40	+1.183	16 17.88	1 11.05	18.
	2	18 50 6.92	11.030	22 57 0.5	13.20	4 0.65	1.170	16 17.88	1 11.01	18.
	3	18 54 31.46	11.016	22 51 29.8	14.34	4 28.57	1.156	16 17.87	1 10.96	18.
	4	18 58 55.65	11.000	22 45 32.0	15.47	4 56.12	1.140	16 17.86	1 10.91	18.
	5	19 3 19.47	10.983	22 39 7.0	16.60	5 23.29	1.123	16 17.84	1 10.85	18.
	6	19 7 42.85	10.965	−22 32 15.0	+17.73	+ 5 50.06	+1.106	16 17.81	1 10.79	19
	7	19 12 5.79	10.946	22 24 56.2	18.84	6 16.37	1.087	16 17.78	1 10.73	19
	8	19 16 28.26	10.926	22 17 10.9	19.94	6 42.20	1.067	16 17.75	1 10.66	19
	9	19 20 50.24	10.904	22 8 59.2	21.03	7 7.55	1.045	16 17.71	1 10.58	19
	10	19 25 11.68	10.882	22 0 21.5	22.11	7 32.36	1.022	16 17.67	1 10.50	19
	11	19 29 32.56	10.858	−21 51 17.9	+23.18	+ 7 56.62	+0.998	16 17.62	1 10.43	19.
	12	19 33 52.86	10.833	21 41 48.8	24.23	8 20.31	0.974	16 17.57	1 10.35	19.
	13	19 38 12.56	10.807	21 31 54.4	25.28	8 43.38	0.948	16 17.52	1 10.26	19.
	14	19 42 31.61	10.780	21 21 35.0	26.32	9 5.81	0.921	16 17.47	1 10.17	19
	15	19 46 50.00	10.752	21 10 51.0	27.34	9 27.59	0.893	16 17.41	1 10.08	19
	16	19 51 7.70	10.723	−20 59 42.7	+28.34	+ 9 48.67	+0.864	16 17.35	1 9.99	19
	17	19 55 24.69	10.693	20 48 10.5	29.33	10 9.04	0.834	16 17.28	1 9.90	19
	18	19 59 40.96	10.662	20 36 14.6	30.32	10 28.70	0.803	16 17.20	1 9.80	19
	19	20 3 56.48	10.631	20 23 55.3	31.29	10 47.62	0.772	16 17.13	1 9.70	19
	20	20 8 11.25	10.599	20 11 13.1	32.23	11 5.77	0.740	16 17.04	1 9.60	19
	21	20 12 25.23	10.567	−19 58 8.3	+33.16	+11 23.16	+0.708	16 16.96	1 9.50	20
	22	20 16 38.44	10.534	19 44 41.3	34.09	11 39.76	0.676	16 16.87	1 9.39	20
	23	20 20 50.86	10.501	19 30 52.2	34.99	11 55.58	0.643	16 16.77	1 9.29	20
	24	20 25 2.48	10.468	19 16 41.7	35.88	12 10.60	0.610	16 16.67	1 9.18	20
	25	20 29 13.30	10.434	19 2 9.9	36.76	12 24.83	0.576	16 16.56	1 9.07	20
	26	20 33 23.32	10.401	−18 47 17.1	+37.62	+12 38.26	+0.543	16 16.45	1 8.96	20
	27	20 37 32.53	10.367	18 32 3.8	38.47	12 50.87	0.509	16 16.32	1 8.85	20
	28	20 41 40.92	10.333	18 16 30.5	39.30	13 2.68	0.475	16 16.19	1 8.73	20
	29	20 45 48.51	10.299	18 0 37.4	40.11	13 13.68	0.442	16 16.06	1 8.62	20
	30	20 49 55.28	10.266	17 44 24.9	40.92	13 23.87	0.408	16 15.92	1 8.51	20
	31	20 54 1.25	10.232	−17 27 53.5	+41.69	+13 33.26	+0.375	16 15.78	1 8.39	20
Feb.	1	20 58 6.41	10.198	17 11 3.4	42.46	13 41.84	0.341	16 15.64	1 8.28	20
	2	21 2 10.75	10.164	16 53 55.1	43.22	13 49.60	0.307	16 15.48	1 8.15	20
	3	21 6 14.30	10.131	16 36 28.9	43.96	13 56.56	0.274	16 15.33	1 8.04	20
	4	21 10 17.04	10.098	16 18 45.4	44.67	14 2.73	0.241	16 15.16	1 7.93	20
	5	21 14 18.97	10.064	−16 0 44.8	+45.37	+14 8.10	+0.207	16 14.98	1 7.81	21
	6	21 18 20.11	10.031	15 42 27.6	46.06	14 12.67	0.174	16 14.81	1 7.70	21
	7	21 22 20.46	9.998	15 23 54.2	46.72	14 16.46	0.141	16 14.64	1 7.59	21
	8	21 26 20.03	9.965	15 5 5.1	47.37	14 19.46	0.108	16 14.47	1 7.47	21
	9	21 30 18.80	9.933	14 46 0.8	47.99	14 21.67	0.076	16 14.29	1 7.36	21
	10	21 34 16.79	9.900	−14 26 41.4	+48.61	+14 23.10	+0.044	16 14.11	1 7.25	21
	11	21 38 14.01	9.868	14 7 7.7	49.19	14 23.77	+0.011	16 13.93	1 7.14	21
	12	21 42 10.45	9.836	13 47 20.0	49.77	14 23.65	−0.021	16 13.74	1 7.03	21
	13	21 46 6.13	9.803	13 27 18.7	50.33	14 22.77	0.053	16 13.55	1 6.92	21
	14	21 50 1.02	9.771	13 7 4.5	50.86	14 21.11	0.085	16 13.36	1 6.81	21
	15	21 53 55.16	9.740	−12 46 37.5	+51.38	+14 18.71	−0.116	16 13.17	1 6.71	21
	16	21 57 48.56	9.709	−12 25 58.4	+51.88	+14 15.56	−0.147	16 12.98	1 6.60	21

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.19 from the sidereal inter

FOR WASHINGTON APPARENT NOON.

FOR WASHINGTON APPARENT NOON.																		
Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.					
	h	m	s	s	°	'	"	"	m	s	s	'	"	m	s	h	m	s
d. 16	21	57	48.56	9.709	−12	25	58.4	+51.88	+14	15.56	−0.147	16	12.98	1	6.60	21	43	30.66
17	22	1	41.21	9.679	12	5	7.3	52.36	14	11.68	0.178	16	12.78	1	6.50	21	47	27.21
18	22	5	33.15	9.649	11	44	5.0	52.83	14	7.06	0.207	16	12.58	1	6.40	21	51	23.76
19	22	9	24.37	9.620	11	22	51.7	53.27	14	1.74	0.236	16	12.38	1	6.30	21	55	20.32
20	22	13	14.89	9.591	11	1	27.8	53.71	13	55.73	0.265	16	12.17	1	6.20	21	59	16.87
21	22	17	4.74	9.563	−10	39	53.7	+54.13	+13	49.04	−0.293	16	11.95	1	6.11	22	3	13.43
22	22	20	53.91	9.535	10	18	9.8	54.52	13	41.69	0.320	16	11.73	1	6.02	22	7	9.98
23	22	24	42.45	9.509	9	56	16.5	54.91	13	33.69	0.347	16	11.51	1	5.93	22	11	6.53
24	22	28	30.37	9.484	9	34	14.2	55.28	13	25.07	0.371	16	11.29	1	5.84	22	15	3.09
25	22	32	17.67	9.459	9	12	3.3	55.62	13	15.85	0.396	16	11.06	1	5.75	22	18	59.64
26	22	36	4.39	9.435	−	8	49 44.0	+55.96	+13	6.04	−0.421	16	10.83	1	5.67	22	22	56.19
27	22	39	50.55	9.411	8	27	17.0	56.29	12	55.67	0.444	16	10.60	1	5.58	22	26	52.75
28	22	43	36.15	9.389	8	4	42.5	56.58	12	44.76	0.466	16	10.36	1	5.50	22	30	49.30
r. 1	22	47	21.23	9.368	7	42	0.9	56.87	12	33.32	0.487	16	10.11	1	5.43	22	34	45.85
2	22	51	5.81	9.348	7	19	12.4	57.15	12	21.37	0.508	16	9.87	1	5.35	22	38	42.41
3	22	54	49.90	9.328	−	6	56 17.7	+57.40	+12	8.94	−0.527	16	9.62	1	5.29	22	42	38.96
4	22	58	33.53	9.309	6	33	17.1	57.64	11	56.05	0.546	16	9.37	1	5.22	22	46	35.51
5	23	2	16.71	9.290	6	10	10.8	57.87	11	42.72	0.565	16	9.11	1	5.15	22	50	32.07
6	23	5	59.47	9.273	5	46	59.4	58.07	11	28.97	0.582	16	8.86	1	5.09	22	54	28.62
7	23	9	41.82	9.257	5	23	43.2	58.27	11	14.81	0.597	16	8.59	1	5.03	22	58	25.17
8	23	13	23.81	9.242	−	5	0 22.4	+58.45	+11	0.28	−0.613	16	8.33	1	4.97	23	2	21.73
9	23	17	5.41	9.227	4	36	57.8	58.60	10	45.37	0.628	16	8.07	1	4.91	23	6	18.28
10	23	20	46.68	9.212	4	13	29.6	58.74	10	30.12	0.642	16	7.81	1	4.86	23	10	14.83
11	23	24	27.61	9.199	3	49	58.1	58.87	10	14.54	0.656	16	7.55	1	4.81	23	14	11.38
12	23	28	8.23	9.186	3	26	23.8	58.98	9	58.64	0.669	16	7.28	1	4.77	23	18	7.94
13	23	31	48.53	9.174	−	3	2 47.2	+59.07	+ 9	42.45	−0.681	16	7.02	1	4.72	23	22	4.49
14	23	35	28.56	9.162	2	39	8.6	59.14	9	25.97	0.692	16	6.76	1	4.68	23	26	1.04
15	23	39	8.31	9.151	2	15	28.4	59.20	9	9.21	0.703	16	6.50	1	4.64	23	29	57.60
16	23	42	47.81	9.141	1	51	47.1	59.24	8	52.21	0.713	16	6.23	1	4.61	23	33	54.15
17	23	46	27.08	9.132	1	28	4.9	59.26	8	34.97	0.723	16	5.97	1	4.58	23	37	50.70
18	23	50	6.14	9.123	−	1	4 22.4	+59.27	+ 8	17.51	−0.732	16	5.71	1	4.55	23	41	47.25
19	23	53	44.99	9.116	0	40	39.8	59.27	7	59.86	0.740	16	5.44	1	4.52	23	45	43.81
20	23	57	23.66	9.109	−	0	16 57.5	59.24	7	42.04	0.746	16	5.18	1	4.51	23	49	40.36
21	0	1	2.17	9.102	+ 0	6 44.2	59.21	59.21	7	24.04	0.752	16	4.91	1	4.49	23	53	36.91
22	0	4	40.56	9.097	0	30	24.8	59.17	7	5.93	0.757	16	4.64	1	4.47	23	57	33.47
23	0	8	18.84	9.093	+ 0	54 4.2	+59.11	+ 6	47.71	−0.762	16	4.37	1	4.46	0	1	30.02	
24	0	11	57.03	9.090	1	17	41.8	59.02	6	29.39	0.765	16	4.10	1	4.45	0	5	26.57
25	0	15	35.15	9.088	1	41	17.5	58.94	6	11.01	0.767	16	3.83	1	4.44	0	9	23.12
26	0	19	13.23	9.086	2	4	50.9	58.84	5	52.58	0.768	16	3.56	1	4.44	0	13	19.68
27	0	22	51.29	9.086	2	28	21.4	58.71	5	34.14	0.768	16	3.28	1	4.44	0	17	16.23
28	0	26	29.35	9.086	+ 2	51 49.0	+58.58	+ 5	15.70	−0.768	16	3.01	1	4.44	0	21	12.78	
29	0	30	7.44	9.088	3	15	13.2	58.44	4	57.29	0.767	16	2.73	1	4.45	0	25	9.33
30	0	33	45.57	9.091	3	38	33.8	58.28	4	38.92	0.763	16	2.45	1	4.45	0	29	5.89
31	0	37	23.79	9.094	4	1	50.3	58.10	4	20.63	0.760	16	2.17	1	4.46	0	33	2.44
r. 1	0	41	2.09	9.098	4	25	2.5	57.91	4	2.43	0.756	16	1.89	1	4.47	0	36	58.99
2	0	44	40.51	9.103	+ 4	48 10.0	+57.71	+ 3	44.35	−0.751	16	1.61	1	4.49	0	40	55.55	
3	0	48	19.07	9.110	+ 5	11 12.4	+57.49	+ 3	26.40	−0.745	16	1.33	1	4.51	0	44	52.10	

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

FOR WASHINGTON APPARENT NOON.																		Sk Th Mean	
Date.		Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.		Var. per Hour.	Semi- diameter.		S. T. of Semi. Pass. Merid.				
		h	m	s	s	°	'	"	"	m	s	s	'	"	m	s	h	m	
Apr.	1	0	41	2.09	9.008	+	4	25	2.5	+57.91	+4	2.43	-0.756	16	1.89	1	4.47	0	30
	2	0	44	40.51	9.103		4	48	10.0	57.71	3	44.35	0.751	16	1.61	1	4.49	0	40
	3	0	48	19.07	9.110		5	11	12.4	57.49	3	26.40	0.745	16	1.33	1	4.51	0	44
	4	0	51	57.79	9.117		5	34	9.5	57.26	3	8.62	0.738	16	1.04	1	4.53	0	48
	5	0	55	36.68	9.125		5	57	0.9	57.02	2	51.00	0.730	16	0.76	1	4.56	0	52
	6	0	59	15.77	9.133	+	6	19	46.1	+56.75	+2	33.59	-0.721	16	0.48	1	4.59	0	56
	7	1	2	55.08	9.143		6	42	25.0	56.48	2	16.40	0.712	16	0.20	1	4.62	1	0
	8	1	6	34.62	9.152		7	4	57.0	56.19	1	59.43	0.702	15	59.92	1	4.65	1	4
	9	1	10	14.40	9.163		7	27	22.0	55.88	1	42.70	0.692	15	59.65	1	4.69	1	8
	10	1	13	54.43	9.174		7	49	39.3	55.56	1	26.22	0.681	15	59.37	1	4.73	1	12
	11	1	17	34.74	9.186	+	8	11	48.8	+55.23	+1	10.03	-0.669	15	59.10	1	4.77	1	16
	12	1	21	15.34	9.198		8	33	50.0	54.87	0	54.11	0.657	15	58.83	1	4.81	1	20
	13	1	24	56.22	9.210		8	55	42.5	54.50	0	38.49	0.644	15	58.56	1	4.85	1	24
	14	1	28	37.41	9.223		9	17	26.1	54.12	0	23.18	0.631	15	58.30	1	4.90	1	28
	15	1	32	18.93	9.237		9	39	0.4	53.72	+0	8.17	0.618	15	58.04	1	4.95	1	32
	16	1	36	0.77	9.251	+10	0	24.9	+53.31	-0	6.50	-0.604	15	57.78	1	5.00	1	36	
	17	1	39	42.97	9.265		10	21	39.4	52.89	0	20.82	0.589	15	57.52	1	5.06	1	40
	18	1	43	25.51	9.280		10	42	43.7	52.46	0	34.79	0.574	15	57.26	1	5.11	1	44
	19	1	47	8.44	9.297		11	3	37.3	52.00	0	48.38	0.559	15	57.01	1	5.17	1	48
	20	1	50	51.76	9.314		11	24	20.0	51.54	1	1.58	0.541	15	56.76	1	5.23	1	52
	21	1	54	35.48	9.331	+11	44	51.3	+51.07	-1	14.37	-0.524	15	56.50	1	5.29	1	56	
	22	1	58	19.62	9.349		12	5	11.1	50.57	1	26.76	0.507	15	56.25	1	5.36	1	59
	23	2	2	4.20	9.367		12	25	19.0	50.07	1	38.70	0.488	15	56.00	1	5.42	2	3
	24	2	5	49.23	9.386		12	45	14.5	49.56	1	50.19	0.469	15	55.75	1	5.49	2	7
	25	2	9	34.72	9.405		13	4	57.6	49.08	2	1.22	0.450	15	55.50	1	5.56	2	11
	26	2	13	20.69	9.425	+13	24	27.8	+48.48	-2	11.78	-0.430	15	55.25	1	5.63	2	15	
	27	2	17	7.16	9.446		13	43	44.8	47.98	2	21.84	0.409	15	55.00	1	5.70	2	19
	28	2	20	54.13	9.468		14	2	48.3	47.36	2	31.39	0.387	15	54.75	1	5.78	2	23
	29	2	24	41.61	9.490		14	21	38.0	46.78	2	40.44	0.365	15	54.50	1	5.86	2	27
	30	2	28	29.63	9.512		14	40	13.7	46.18	2	48.95	0.343	15	54.26	1	5.94	2	31
May	1	2	32	18.20	9.535	+14	58	35.0	+45.58	-2	56.91	-0.320	15	54.01	1	6.01	2	35	
	2	2	36	7.32	9.558		15	16	41.5	44.96	3	4.33	0.297	15	53.77	1	6.09	2	39
	3	2	39	57.01	9.582		15	34	33.0	44.32	3	11.18	0.274	15	53.53	1	6.17	2	43
	4	2	43	47.26	9.606		15	52	9.1	43.68	3	17.47	0.250	15	53.29	1	6.25	2	47
	5	2	47	38.09	9.630		16	9	29.5	43.02	3	23.17	0.226	15	53.05	1	6.33	2	51
	6	2	51	29.50	9.654	+16	26	33.9	+42.34	-3	28.31	-0.202	15	52.82	1	6.41	2	55	
	7	2	55	21.50	9.679		16	43	22.0	41.65	3	32.85	0.177	15	52.59	1	6.49	2	59
	8	2	59	14.08	9.703		16	59	53.4	40.96	3	36.82	0.153	15	52.36	1	6.57	3	3
	9	3	3	7.24	9.727		17	16	8.0	40.26	3	40.20	0.129	15	52.14	1	6.65	3	7
	10	3	7	0.98	9.751		17	32	5.1	39.51	3	43.01	0.105	15	51.93	1	6.74	3	11
	11	3	10	55.30	9.775	+17	47	44.8	+38.78	-3	45.24	-0.081	15	51.71	1	6.82	3	15	
	12	3	14	50.19	9.799		18	3	6.3	38.02	3	46.90	0.057	15	51.51	1	6.90	3	19
	13	3	18	45.64	9.822		18	18	9.7	37.26	3	48.00	0.034	15	51.31	1	6.98	3	23
	14	3	22	41.66	9.846		18	32	54.8	36.48	3	48.54	-0.011	15	51.11	1	7.06	3	27
	15	3	26	38.24	9.869		18	47	20.9	35.69	3	48.52	+0.012	15	50.91	1	7.15	3	31
	16	3	30	35.37	9.892	+19	1	28.0	+34.89	-3	47.94	+0.036	15	50.72	1	7.23	3	35	
	17	3	34	33.04	9.915	+19	15	15.8	+34.09	-3	46.82	+0.058	15	50.53	1	7.31	3	39	

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal inter

FOR WASHINGTON APPARENT NOON.

FOR WASHINGTON APPARENT NOON.														Sidereal Time of Mean Noon.				
ste.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.						
	h	m	s	s	°	'	"	"	m	s	'	"	m	s	h	m	s	
17	3	34	33.04	9.915	+19	15	15.8	+34.09	−3	46.82	+0.058	15	50.53	1	7.31	3	38	20.49
18	3	38	31.27	9.938	19	28	43.9	33.26	3	45.16	0.081	15	50.34	1	7.39	3	42	17.04
19	3	42	30.04	9.960	19	41	52.3	32.43	3	42.96	0.103	15	50.16	1	7.47	3	46	13.60
20	3	46	29.34	9.982	19	54	40.6	31.59	3	40.22	0.125	15	49.98	1	7.55	3	50	10.16
21	3	50	29.17	10.004	20	7	8.5	30.74	3	36.95	0.147	15	49.81	1	7.62	3	54	6.71
22	3	54	29.54	10.026	+20	19	15.7	+29.86	−3	33.16	+0.169	15	49.63	1	7.70	3	58	3.27
23	3	58	30.42	10.047	20	31	2.2	28.99	3	28.84	0.191	15	49.46	1	7.77	4	1	59.83
24	4	2	31.81	10.068	20	42	27.5	28.11	3	24.02	0.211	15	49.29	1	7.85	4	5	56.38
25	4	6	33.71	10.089	20	53	31.5	27.22	3	18.69	0.232	15	49.12	1	7.91	4	9	52.94
26	4	10	36.12	10.110	21	4	14.0	26.32	3	12.85	0.253	15	48.97	1	7.98	4	13	49.50
27	4	14	39.01	10.130	+21	14	34.9	+25.42	−3	6.53	+0.273	15	48.81	1	8.05	4	17	46.05
28	4	18	42.40	10.151	21	24	33.7	24.49	2	59.71	0.293	15	48.65	1	8.12	4	21	42.61
29	4	22	46.26	10.170	21	34	10.4	23.56	2	52.43	0.313	15	48.49	1	8.18	4	25	39.17
30	4	26	50.59	10.190	21	43	24.6	22.62	2	44.68	0.333	15	48.33	1	8.24	4	29	35.73
31	4	30	55.38	10.209	21	52	16.3	21.68	2	36.47	0.351	15	48.18	1	8.30	4	33	32.28
1	4	35	0.61	10.227	+22	0	45.2	+20.73	−2	27.82	+0.369	15	48.04	1	8.36	4	37	28.84
2	4	39	6.28	10.245	22	8	51.2	19.76	2	18.74	0.387	15	47.89	1	8.42	4	41	25.40
3	4	43	12.35	10.261	22	16	34.1	18.80	2	9.24	0.404	15	47.75	1	8.47	4	45	21.95
4	4	47	18.83	10.277	22	23	53.5	17.82	1	59.36	0.419	15	47.61	1	8.52	4	49	18.51
5	4	51	25.67	10.293	22	30	49.4	16.84	1	49.09	0.435	15	47.48	1	8.57	4	53	15.07
6	4	55	32.87	10.307	+22	37	21.7	+15.85	−1	38.48	+0.449	15	47.36	1	8.62	4	57	11.63
7	4	59	40.40	10.320	22	43	30.3	14.86	1	27.54	0.463	15	47.24	1	8.66	5	1	8.18
8	5	3	48.25	10.332	22	49	14.9	13.86	1	16.29	0.474	15	47.13	1	8.70	5	5	4.74
9	5	7	56.36	10.343	22	54	35.5	12.86	1	4.76	0.485	15	47.02	1	8.74	5	9	1.30
10	5	12	4.73	10.353	22	59	31.9	11.84	0	52.98	0.496	15	46.92	1	8.77	5	12	57.86
11	5	16	13.34	10.363	+23	4	4.0	+10.83	−0	40.96	+0.505	15	46.82	1	8.80	5	16	54.41
12	5	20	22.14	10.370	23	8	11.7	9.81	0	28.75	0.513	15	46.72	1	8.83	5	20	50.97
13	5	24	31.12	10.377	23	11	54.9	8.79	0	16.36	0.519	15	46.63	1	8.86	5	24	47.53
14	5	28	40.25	10.383	23	15	13.8	7.77	−0	3.81	0.525	15	46.55	1	8.87	5	28	44.09
15	5	32	49.52	10.388	23	18	7.9	6.74	+0	8.86	0.530	15	46.47	1	8.89	5	32	40.64
16	5	36	58.90	10.393	+23	20	37.5	+5.72	+0	21.64	+0.535	15	46.41	1	8.91	5	36	37.20
17	5	41	8.36	10.395	23	22	42.3	4.69	0	34.51	0.538	15	46.34	1	8.92	5	40	33.76
18	5	45	17.88	10.397	23	24	22.4	3.66	0	47.43	0.539	15	46.27	1	8.93	5	44	30.32
19	5	49	27.43	10.398	23	25	37.6	2.62	1	0.40	0.540	15	46.21	1	8.94	5	48	26.87
20	5	53	37.01	10.399	23	26	28.1	1.59	1	13.38	0.541	15	46.15	1	8.95	5	52	23.43
21	5	57	46.57	10.398	+23	26	53.9	+0.56	+1	26.35	+0.540	15	46.09	1	8.95	5	56	19.99
22	6	1	56.12	10.397	23	26	55.0	−0.47	1	39.30	0.539	15	46.04	1	8.94	6	0	16.55
23	6	6	5.61	10.394	23	26	31.2	1.51	1	52.20	0.536	15	45.99	1	8.94	6	4	13.10
24	6	10	15.04	10.391	23	25	42.5	2.54	2	5.03	0.533	15	45.95	1	8.93	6	8	9.66
25	6	14	24.38	10.387	23	24	29.2	3.57	2	17.78	0.529	15	45.90	1	8.91	6	12	6.22
26	6	18	33.61	10.382	+23	22	51.1	−4.60	+2	30.42	+0.524	15	45.86	1	8.90	6	16	2.78
27	6	22	42.72	10.377	23	20	48.4	5.63	2	42.95	0.519	15	45.83	1	8.88	6	19	59.33
28	6	26	51.69	10.371	23	18	21.0	6.66	2	55.33	0.513	15	45.80	1	8.84	6	23	55.89
29	6	31	0.51	10.363	23	15	29.1	7.68	3	7.55	0.505	15	45.77	1	8.82	6	27	52.45
30	6	35	9.14	10.355	23	12	12.6	8.70	3	19.58	0.497	15	45.74	1	8.79	6	31	49.01
1	6	39	17.56	10.346	+23	8	31.6	−9.72	+3	31.42	+0.489	15	45.73	1	8.76	6	35	45.57
2	6	43	25.76	10.337	+23	4	26.3	−10.73	+3	43.04	+0.479	15	45.71	1	8.72	6	39	42.12

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.19 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sid Tim Mean
		h m s	s	° ' "	"	m s	s	' "	m s	h m
July	1	6 39 17.56	10.346	+23 8 31.6	− 9.72	+3 31.42	+0.489	15 45.73	1 8.76	6 35
	2	6 43 25.76	10.337	23 4 26.3	10.73	3 43.04	0.479	15 45.71	1 8.72	6 39
	3	6 47 33.72	10.326	22 59 56.8	11.73	3 54.40	0.468	15 45.70	1 8.68	6 43
	4	6 51 41.41	10.314	22 55 3.2	12.73	4 5.49	0.456	15 45.69	1 8.64	6 47
	5	6 55 48.79	10.301	22 49 45.5	13.73	4 16.30	0.443	15 45.69	1 8.60	6 51
	6	6 59 55.86	10.287	+22 44 4.0	−14.72	+4 26.78	+0.430	15 45.69	1 8.55	6 55
	7	7 4 2.58	10.273	22 37 58.8	15.71	4 38.92	0.415	15 45.70	1 8.50	6 59
	8	7 8 8.95	10.257	22 31 29.9	16.69	4 46.70	0.400	15 45.72	1 8.45	7 3
	9	7 12 14.92	10.240	22 24 37.7	17.66	4 56.08	0.382	15 45.74	1 8.39	7 7
	10	7 16 20.48	10.223	22 17 22.2	18.63	5 5.07	0.365	15 45.77	1 8.34	7 11
	11	7 20 25.62	10.204	+22 9 43.9	−19.57	+5 13.61	+0.347	15 45.81	1 8.28	7 15
	12	7 24 30.29	10.185	22 1 42.6	20.52	5 21.72	0.328	15 45.84	1 8.22	7 19
	13	7 28 34.50	10.166	21 53 18.7	21.46	5 29.34	0.308	15 45.89	1 8.15	7 23
	14	7 32 38.22	10.145	21 44 32.2	22.40	5 36.49	0.288	15 45.93	1 8.09	7 27
	15	7 36 41.44	10.123	21 35 23.7	23.32	5 43.14	0.266	15 45.99	1 8.02	7 30
	16	7 40 44.15	10.101	+21 25 53.1	−24.23	+5 49.27	+0.244	15 46.04	1 7.95	7 34
	17	7 44 46.33	10.079	21 16 0.7	25.13	5 54.88	0.222	15 46.11	1 7.87	7 38
	18	7 48 47.97	10.057	21 5 46.7	26.03	5 59.95	0.200	15 46.17	1 7.79	7 42
	19	7 52 49.05	10.034	20 55 11.4	26.91	6 4.46	0.176	15 46.24	1 7.72	7 46
	20	7 56 49.58	10.010	20 44 14.8	27.79	6 8.42	0.153	15 46.32	1 7.64	7 50
	21	8 0 49.54	9.987	+20 32 57.5	−28.66	+6 11.82	+0.130	15 46.40	1 7.56	7 54
	22	8 4 48.94	9.963	20 21 19.3	29.51	6 14.65	0.106	15 46.48	1 7.48	7 58
	23	8 8 47.75	9.939	20 9 20.8	30.36	6 16.89	0.082	15 46.56	1 7.40	8 2
	24	8 12 45.99	9.915	19 57 2.1	31.20	6 18.57	0.058	15 46.65	1 7.32	8 6
	25	8 16 43.64	9.890	19 44 23.4	32.03	6 19.67	0.034	15 46.73	1 7.24	8 10
	26	8 20 40.71	9.866	+19 31 24.9	−32.84	+6 20.19	+0.010	15 46.83	1 7.15	8 14
	27	8 24 37.21	9.842	19 18 7.0	33.65	6 20.12	−0.015	15 46.92	1 7.07	8 18
	28	8 28 33.12	9.818	19 4 29.8	34.44	6 19.48	0.039	15 47.02	1 6.98	8 22
	29	8 32 28.44	9.793	18 50 33.7	35.23	6 18.26	0.063	15 47.12	1 6.90	8 26
	30	8 36 23.19	9.769	18 36 18.7	36.00	6 16.45	0.087	15 47.22	1 6.81	8 30
	31	8 40 17.35	9.745	+18 21 45.3	−36.76	+6 14.05	−0.112	15 47.33	1 6.72	8 34
Aug.	1	8 44 10.92	9.720	18 6 53.8	37.52	6 11.07	0.136	15 47.44	1 6.63	8 37
	2	8 48 3.89	9.695	17 51 44.5	38.26	6 7.50	0.161	15 47.57	1 6.55	8 41
	3	8 51 56.29	9.671	17 36 17.7	38.97	6 3.35	0.185	15 47.69	1 6.46	8 45
	4	8 55 48.07	9.646	17 20 33.6	39.69	5 58.60	0.210	15 47.82	1 6.37	8 49
	5	8 59 39.27	9.621	+17 4 32.6	−40.39	+5 53.25	−0.235	15 47.95	1 6.28	8 53
	6	9 3 29.87	9.596	16 48 15.1	41.07	5 47.31	0.260	15 48.09	1 6.20	8 57
	7	9 7 19.87	9.571	16 31 41.2	41.74	5 40.78	0.284	15 48.23	1 6.11	9 1
	8	9 11 9.27	9.546	16 14 51.3	42.40	5 33.65	0.309	15 48.38	1 6.03	9 5
	9	9 14 58.09	9.522	15 57 45.9	43.05	5 25.93	0.334	15 48.53	1 5.94	9 9
	10	9 18 46.31	9.497	+15 40 25.0	−43.68	+5 17.62	−0.358	15 48.69	1 5.86	9 13
	11	9 22 33.95	9.473	15 22 49.3	44.29	5 8.72	0.383	15 48.86	1 5.77	9 17
	12	9 26 21.00	9.449	15 4 58.9	44.90	4 59.24	0.407	15 49.03	1 5.69	9 21
	13	9 30 7.47	9.425	14 46 54.0	45.50	4 49.19	0.431	15 49.20	1 5.61	9 25
	14	9 33 53.37	9.401	14 28 35.1	46.07	4 38.57	0.454	15 49.37	1 5.53	9 29
	15	9 37 38.72	9.378	+14 10 2.5	−46.04	+4 27.39	−0.477	15 49.55	1 5.45	9 33
	16	9 41 23.51	9.355	+13 51 16.5	−47.19	+4 15.65	−0.500	15 49.73	1 5.38	9 37

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval

FOR WASHINGTON APPARENT NOON.

FOR WASHINGTON APPARENT NOON.										
Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.	
	h m s	s	° ' "	"	m s	s	' "	m s	h m s	
16	9 41 23.51	9.355	+13 51 16.5	-47.19	+ 4 15.65	-0.500	15 49.73	1 5.38	9 37 7.15	
17	9 45 7.75	9.332	13 32 17.2	47.74	4 3.38	0.523	15 49.91	1 5.30	9 41 3.70	
18	9 48 51.46	9.311	13 13 5.4	48.26	3 50.57	0.544	15 50.10	1 5.23	9 45 0.26	
19	9 52 34.66	9.290	12 53 40.9	48.77	3 37.26	0.565	15 50.29	1 5.15	9 48 56.81	
20	9 56 17.35	9.269	12 34 4.2	49.28	3 23.43	0.586	15 50.48	1 5.09	9 52 53.37	
21	9 59 59.56	9.249	+12 14 15.7	-49.76	+ 3 9.13	-0.606	15 50.68	1 5.02	9 56 49.92	
22	10 3 41.30	9.230	11 54 15.5	50.24	2 54.35	0.625	15 50.87	1 4.95	10 0 46.48	
23	10 7 22.57	9.211	11 34 3.9	50.71	2 39.11	0.644	15 51.07	1 4.89	10 4 43.03	
24	10 11 3.42	9.193	11 13 41.3	51.17	2 23.45	0.662	15 51.27	1 4.82	10 8 39.58	
25	10 14 43.85	9.177	10 53 7.9	51.60	2 7.37	0.679	15 51.47	1 4.76	10 12 36.14	
26	10 18 23.89	9.161	+10 32 24.1	-52.04	+ 1 50.89	-0.694	15 51.68	1 4.70	10 16 32.69	
27	10 22 3.54	9.145	10 11 30.2	52.45	1 34.04	0.710	15 51.88	1 4.64	10 20 29.24	
28	10 25 42.82	9.130	9 50 26.4	52.86	1 18.81	0.725	15 52.09	1 4.58	10 24 25.80	
29	10 29 21.75	9.115	9 29 13.1	53.24	0 59.24	0.739	15 52.30	1 4.53	10 28 22.35	
30	10 33 0.35	9.102	9 7 50.5	53.62	0 41.34	0.753	15 52.52	1 4.48	10 32 18.90	
31	10 36 38.63	9.088	+ 8 46 19.1	-53.99	+ 0 23.11	-0.766	15 52.74	1 4.43	10 36 15.46	
1	10 40 16.61	9.076	8 24 39.3	54.33	+ 0 4.58	0.778	15 52.96	1 4.38	10 40 12.01	
2	10 43 54.29	9.064	8 2 51.4	54.66	- 0 14.24	0.790	15 53.18	1 4.34	10 44 8.56	
3	10 47 31.69	9.053	7 40 55.5	54.98	0 33.34	0.801	15 53.40	1 4.30	10 48 5.12	
4	10 51 8.83	9.043	7 18 52.2	55.28	0 52.70	0.812	15 53.64	1 4.26	10 52 1.67	
5	10 54 45.72	9.032	+ 6 56 41.9	-55.57	- 1 12.31	-0.822	15 53.88	1 4.22	10 55 58.22	
6	10 58 22.37	9.023	6 34 24.6	55.85	1 32.16	0.831	15 54.12	1 4.18	10 59 54.78	
7	11 1 58.81	9.014	6 12 0.9	56.12	1 52.21	0.840	15 54.36	1 4.15	11 3 51.33	
8	11 5 35.03	9.006	5 49 31.2	56.36	2 12.49	0.849	15 54.60	1 4.12	11 7 47.88	
9	11 9 11.07	8.999	5 26 55.8	56.59	2 32.94	0.855	15 54.85	1 4.11	11 11 44.44	
10	11 12 46.95	8.992	+ 5 4 14.9	-56.81	- 2 53.57	-0.862	15 55.10	1 4.09	11 15 40.99	
11	11 16 22.67	8.986	4 41 28.9	57.01	3 14.34	0.868	15 55.36	1 4.07	11 19 37.54	
12	11 19 58.25	8.980	4 18 38.1	57.21	3 35.26	0.874	15 55.61	1 4.05	11 23 34.09	
13	11 23 33.71	8.975	3 55 43.0	57.38	3 56.29	0.879	15 55.88	1 4.04	11 27 30.65	
14	11 27 9.07	8.971	3 32 43.8	57.54	4 17.43	0.883	15 56.14	1 4.03	11 31 27.20	
15	11 30 44.34	8.969	+ 3 9 40.9	-57.69	- 4 38.65	-0.886	15 56.40	1 4.02	11 35 23.75	
16	11 34 19.56	8.967	2 46 34.5	57.83	4 59.92	0.887	15 56.67	1 4.01	11 39 20.31	
17	11 37 54.74	8.966	2 23 24.9	57.96	5 21.24	0.889	15 56.94	1 4.01	11 43 16.86	
18	11 41 29.90	8.965	2 0 12.7	58.06	5 42.58	0.889	15 57.20	1 4.01	11 47 13.41	
19	11 45 5.06	8.966	1 36 57.8	58.16	6 3.90	0.888	15 57.46	1 4.01	11 51 9.96	
20	11 48 40.26	8.968	+ 1 13 40.8	-58.25	- 6 25.20	-0.887	15 57.73	1 4.02	11 55 6.52	
21	11 52 15.52	8.971	0 50 21.9	58.32	6 46.43	0.883	15 57.99	1 4.03	11 59 3.07	
22	11 55 50.86	8.975	0 27 1.4	58.38	7 7.59	0.880	15 58.25	1 4.04	12 2 59.62	
23	11 59 26.31	8.980	+ 0 3 39.6	58.43	7 28.65	0.875	15 58.52	1 4.06	12 6 56.17	
24	12 3 1.88	8.985	- 0 19 43.1	58.46	7 49.57	0.869	15 58.78	1 4.07	12 10 52.72	
25	12 6 37.61	8.993	- 0 43 6.4	-58.47	- 8 10.32	-0.862	15 59.05	1 4.10	12 14 49.28	
26	12 10 13.52	9.001	1 6 30.1	58.48	8 30.91	0.854	15 59.31	1 4.13	12 18 45.83	
27	12 13 49.62	9.009	1 29 53.7	58.48	8 51.31	0.845	15 59.58	1 4.16	12 22 42.38	
28	12 17 25.95	9.018	1 53 16.8	58.44	9 11.48	0.836	15 59.85	1 4.19	12 26 38.93	
29	12 21 2.51	9.029	2 16 39.1	58.41	9 31.41	0.826	16 0.11	1 4.22	12 30 35.49	
30	12 24 39.33	9.040	- 2 40 0.3	-58.35	- 9 51.09	-0.815	16 0.38	1 4.26	12 34 32.04	
1	12 28 16.43	9.052	- 3 3 20.0	-58.28	-10 10.49	-0.802	16 0.65	1 4.30	12 38 28.59	

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0°.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sk Tt Mean
		h m s	s	° ' "	"	m s	s	' "	m s	h
Oct.	1	12 28 16.43	9.052	— 3 3 20.0	—58.28	—10 10.49	—0.802	16 0.65	1 4.30	12 3
	2	12 31 53.82	9.065	3 26 37.7	58.19	10 29.61	0.790	16 0.93	1 4.34	12 4
	3	12 35 31.52	9.078	3 49 53.2	58.09	10 48.41	0.776	16 1.20	1 4.38	12 4
	4	12 39 9.54	9.092	4 13 6.0	57.97	11 6.88	0.763	16 1.47	1 4.43	12 5
	5	12 42 47.92	9.106	4 36 15.8	57.84	11 25.00	0.748	16 1.75	1 4.48	12 5
	6	12 46 26.66	9.122	— 4 59 22.2	—57.69	—11 42.77	—0.733	16 2.03	1 4.54	12 5
	7	12 50 5.77	9.138	5 22 24.9	57.52	12 0.17	0.716	16 2.31	1 4.60	13
	8	12 53 45.28	9.155	5 45 23.4	57.34	12 17.16	0.699	16 2.59	1 4.66	13
	9	12 57 25.21	9.173	6 8 17.4	57.15	12 33.75	0.682	16 2.87	1 4.72	13 1
	10	13 1 5.56	9.191	6 31 6.4	56.93	12 49.90	0.664	16 3.15	1 4.79	13 1
	11	13 4 46.36	9.210	— 6 53 50.3	—56.71	—13 5.61	—0.645	16 3.43	1 4.86	13 1
	12	13 8 27.63	9.229	7 16 28.3	56.46	13 20.86	0.626	16 3.71	1 4.93	13 2
	13	13 12 9.37	9.249	7 39 0.4	56.20	13 35.62	0.605	16 3.99	1 5.01	13 2
	14	13 15 51.62	9.271	8 1 26.1	55.93	13 49.89	0.583	16 4.28	1 5.09	13 2
	15	13 19 34.38	9.293	8 23 45.0	55.64	14 3.64	0.561	16 4.55	1 5.17	13 3
	16	13 23 17.68	9.316	— 8 45 56.8	—55.33	—14 16.86	—0.539	16 4.83	1 5.25	13 3
	17	13 27 1.54	9.339	9 8 1.0	55.01	14 29.51	0.516	16 5.11	1 5.34	13 4
	18	13 30 45.98	9.364	9 29 57.4	54.68	14 41.59	0.491	16 5.39	1 5.42	13 4
	19	13 34 31.01	9.390	9 51 45.5	54.32	14 53.09	0.466	16 5.66	1 5.51	13 4
	20	13 38 16.66	9.416	10 13 24.9	53.96	15 3.96	0.439	16 5.93	1 5.60	13 5
	21	13 42 2.96	9.443	—10 34 55.7	—53.58	—15 14.18	—0.412	16 6.20	1 5.70	13 5
	22	13 45 49.92	9.471	10 56 17.0	53.18	15 23.75	0.384	16 6.46	1 5.79	14
	23	13 49 37.57	9.500	11 17 28.6	52.77	15 32.64	0.356	16 6.73	1 5.89	14
	24	13 53 25.92	9.529	11 38 30.0	52.35	15 40.81	0.326	16 6.98	1 5.99	14
	25	13 57 15.00	9.560	11 59 21.0	51.90	15 48.28	0.296	16 7.23	1 6.09	14 1
	26	14 1 4.80	9.591	—12 20 1.1	—51.44	—15 55.01	—0.265	16 7.50	1 6.20	14 1
	27	14 4 55.34	9.622	12 40 29.9	50.96	16 0.99	0.233	16 7.75	1 6.30	14 2
	28	14 8 46.66	9.654	13 0 47.0	50.46	16 6.21	0.202	16 8.00	1 6.41	14 2
	29	14 12 38.75	9.687	13 20 51.9	49.95	16 10.66	0.169	16 8.25	1 6.52	14 2
	30	14 16 31.62	9.719	13 40 44.3	49.41	16 14.35	0.137	16 8.50	1 6.63	14 3
	31	14 20 25.28	9.752	—14 0 23.7	—48.86	—16 17.24	—0.104	16 8.75	1 6.74	14 3
Nov.	1	14 24 19.73	9.786	14 19 49.8	48.30	16 19.34	0.071	16 9.00	1 6.85	14 4
	2	14 28 14.99	9.819	14 39 2.0	47.71	16 20.63	0.037	16 9.25	1 6.96	14 4
	3	14 32 11.07	9.853	14 57 59.9	47.11	16 21.10	—0.003	16 9.49	1 7.09	14 4
	4	14 36 7.95	9.887	15 16 43.3	46.50	16 20.78	+0.031	16 9.74	1 7.20	14 5
	5	14 40 5.66	9.921	—15 35 11.6	—45.85	—16 19.62	+0.065	16 9.99	1 7.31	14 5
	6	14 44 4.20	9.956	15 53 24.4	45.20	16 17.65	0.099	16 10.23	1 7.44	15
	7	14 48 3.55	9.990	16 11 21.4	44.54	16 14.86	0.133	16 10.47	1 7.56	15
	8	14 52 3.74	10.025	16 29 1.9	43.84	16 11.23	0.168	16 10.71	1 7.68	15
	9	14 56 4.75	10.059	16 46 25.8	43.14	16 6.78	0.202	16 10.95	1 7.80	15 1
	10	15 0 6.60	10.094	—17 3 32.6	—42.41	—16 1.50	+0.237	16 11.19	1 7.92	15 1
	11	15 4 9.28	10.128	17 20 21.9	41.68	15 55.39	0.271	16 11.42	1 8.04	15 2
	12	15 8 12.79	10.163	17 36 53.2	40.93	15 48.46	0.306	16 11.66	1 8.16	15 2
	13	15 12 17.13	10.198	17 53 6.1	40.15	15 40.70	0.340	16 11.88	1 8.28	15 2
	14	15 16 22.30	10.232	18 9 0.5	39.37	15 32.11	0.375	16 12.11	1 8.40	15 3
	15	15 20 28.30	10.267	—18 24 35.8	—38.57	—15 22.68	+0.410	16 12.33	1 8.51	15 3
	16	15 24 35.14	10.302	—18 39 51.5	—37.74	—15 12.43	+0.444	16 12.54	1 8.62	15 3

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval

FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ' "	"	m s	s	' "	m s	h m s
ov. 16	15 24 35.14	10.302	−18 39 51.5	−37.74	−15 12.43	+0.444	16 12.54	1 8.62	15 39 50.07
17	15 28 42.81	10.337	18 54 47.4	36.91	15 1.35	0.479	16 12.75	1 8.75	15 43 46.63
18	15 32 51.32	10.371	19 9 23.3	36.07	14 49.43	0.514	16 12.95	1 8.86	15 47 43.19
19	15 37 0.66	10.406	19 23 38.4	35.19	14 36.69	0.548	16 13.16	1 8.97	15 51 39.74
20	15 41 10.83	10.441	19 37 32.6	34.32	14 23.11	0.583	16 13.35	1 9.09	15 55 36.30
21	15 45 21.82	10.475	−19 51 5.6	−33.43	−14 8.70	+0.617	16 13.55	1 9.20	15 59 32.86
22	15 49 33.65	10.509	20 4 16.9	32.51	13 53.48	0.651	16 13.73	1 9.31	16 3 29.41
23	15 53 46.29	10.543	20 17 6.2	31.59	13 37.43	0.685	16 13.92	1 9.42	16 7 25.97
24	15 57 59.75	10.577	20 29 33.1	30.65	13 20.59	0.718	16 14.10	1 9.53	16 11 22.53
25	16 2 13.98	10.610	20 41 37.2	29.69	13 2.96	0.751	16 14.27	1 9.63	16 15 19.08
26	16 6 29.00	10.642	−20 53 18.3	−28.72	−12 44.54	+0.784	16 14.44	1 9.73	16 19 15.64
27	16 10 44.79	10.674	21 4 35.9	27.74	12 25.36	0.815	16 14.61	1 9.83	16 23 12.20
28	16 15 1.33	10.704	21 15 29.7	26.75	12 5.43	0.846	16 14.77	1 9.93	16 27 8.75
29	16 19 18.59	10.734	21 25 59.6	25.73	11 44.79	0.875	16 14.93	1 10.03	16 31 5.31
30	16 23 36.55	10.763	21 36 4.9	24.71	11 23.44	0.904	16 15.08	1 10.12	16 35 1.87
ec. 1	16 27 55.21	10.791	−21 45 45.7	−23.68	−11 1.40	+0.932	16 15.24	1 10.21	16 38 58.42
2	16 32 14.51	10.818	21 55 1.3	22.62	10 38.72	0.959	16 15.40	1 10.30	16 42 54.98
3	16 36 34.47	10.844	22 3 51.7	21.56	10 15.38	0.984	16 15.55	1 10.39	16 46 51.54
4	16 40 55.03	10.869	22 12 16.5	20.50	9 51.44	1.009	16 15.69	1 10.47	16 50 48.10
5	16 45 16.17	10.893	22 20 15.5	19.42	9 26.94	1.033	16 15.84	1 10.55	16 54 44.65
6	16 49 37.86	10.914	−22 27 48.4	−18.33	− 9 1.87	+1.056	16 15.98	1 10.61	16 58 41.21
7	16 54 0.07	10.935	22 34 55.0	17.22	8 36.28	1.076	16 16.11	1 10.68	17 2 37.77
8	16 58 22.79	10.956	22 41 35.1	16.11	8 10.20	1.096	16 16.25	1 10.75	17 6 34.33
9	17 2 45.96	10.975	22 47 48.5	15.00	7 43.66	1.115	16 16.37	1 10.81	17 10 30.88
10	17 7 9.55	10.992	22 53 34.9	13.87	7 16.69	1.133	16 16.50	1 10.87	17 14 27.44
11	17 11 33.56	11.008	−22 58 54.2	−12.74	− 6 49.32	+1.148	16 16.61	1 10.93	17 18 24.00
12	17 15 57.93	11.023	23 3 46.1	11.60	6 21.58	1.163	16 16.72	1 10.98	17 22 20.56
13	17 20 22.64	11.036	23 8 10.6	10.44	5 53.50	1.177	16 16.83	1 11.03	17 26 17.12
14	17 24 47.67	11.049	23 12 7.6	9.29	5 25.12	1.189	16 16.94	1 11.07	17 30 13.67
15	17 29 12.98	11.060	23 15 36.8	8.14	4 56.45	1.200	16 17.04	1 11.11	17 34 10.23
16	17 33 38.54	11.070	−23 18 38.2	− 6.97	− 4 27.53	+1.210	16 17.13	1 11.15	17 38 6.79
17	17 38 4.33	11.079	23 21 11.6	5.81	3 58.37	1.219	16 17.22	1 11.18	17 42 3.35
18	17 42 30.32	11.087	23 23 17.1	4.64	3 29.02	1.227	16 17.30	1 11.21	17 45 59.91
19	17 46 56.47	11.093	23 24 54.3	3.47	2 59.49	1.233	16 17.36	1 11.22	17 49 56.46
20	17 51 22.77	11.098	23 26 3.4	2.29	2 29.84	1.238	16 17.43	1 11.23	17 53 53.02
21	17 55 49.18	11.102	−23 26 44.1	− 1.11	− 2 0.06	+1.243	16 17.49	1 11.24	17 57 49.58
22	18 0 15.68	11.105	23 26 56.7	+ 0.07	1 30.21	1.244	16 17.55	1 11.25	18 1 46.14
23	18 4 42.23	11.106	23 26 40.8	1.26	1 0.31	1.246	16 17.60	1 11.25	18 5 42.70
24	18 9 8.78	11.106	23 25 56.7	2.43	0 30.39	1.246	16 17.64	1 11.25	18 9 39.25
25	18 13 35.30	11.104	23 24 44.3	3.61	− 0 0.49	1.245	16 17.68	1 11.24	18 13 35.81
26	18 18 1.80	11.101	−23 23 3.6	+ 4.78	+ 0 29.35	+1.242	16 17.72	1 11.23	18 17 32.37
27	18 22 28.19	11.097	23 20 54.6	5.96	0 59.11	1.237	16 17.75	1 11.21	18 21 28.93
28	18 26 54.46	11.090	23 18 17.5	7.13	1 28.74	1.232	16 17.76	1 11.19	18 25 25.49
29	18 31 20.57	11.083	23 15 12.2	8.30	1 58.21	1.224	16 17.78	1 11.16	18 29 22.04
30	18 35 46.48	11.075	23 11 38.9	9.47	2 27.48	1.215	16 17.80	1 11.13	18 33 18.60
31	18 40 12.16	11.065	−23 7 37.7	+10.63	+ 2 56.52	+1.205	16 17.81	1 11.10	18 37 15.16

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0^m.19 from the sidereal interval.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Jan. 23, U Defective Illumination of $N. 0''.60$.
Jan. 24, U Defective Illumination of $S. 0''.64$.

Jan. 25, U Defective Illumination of $N. 0''.81$.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Feb. 19, U Defective Illumination of N. 0''.52.
Feb. 20, U Defective illumination of S. 0''.54.
Feb. 23, U Defective Illumination of S. 0''.32.

Feb. 24, U Defective Illumination of N. 0''.25.
Feb. 25, U Defective Illumination of I. 0''.02.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

May 23, U Defective Illumination of S. $0''.72$.
 May 24, U Defective Illumination of N. $0''.07$.
 May 25, U Defective Illumination of N. $0''.82$.

May 26, U Defective Illumination of N. $0''.44$.
 May 27, U Defective Illumination of S. $0''.10$.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

July 20, U Defective Illumination of S. $0''.12$.
July 21, U Defective Illumination of N. $0''.02$.

July 22, U Defective Illumination of S. $0''.08$.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Sept. 8	U	2 7.23	1.788	13 15 22.40	117.45	-12 26 18.2	-604.2	62.33	14 44.1	53 59.0	I. N.
8	L	14 28.88	1.822	13 39 3.58	119.47	14 23 7.8	563.0	62.91	14 44.7	54 1.1	
9	U	2 50.97	1.861	14 3 10.95	121.81	16 11 4.8	515.5	63.58	14 45.9	54 5.4	I. N.
9	L	15 13.56	1.904	14 27 47.92	124.39	17 48 53.0	461.5	64.30	14 47.6	54 11.8	
10	U	3 36.68	1.950	14 52 57.10	127.16	-19 15 14.4	-401.1	65.07	14 50.0	54 20.5	I. N.
10	L	16 0.36	1.997	15 18 40.10	130.01	20 28 51.7	334.2	65.85	14 53.1	54 31.7	
11	U	4 24.61	2.044	15 44 57.42	132.86	21 28 27.4	290.8	66.62	14 56.8	54 45.4	I. N.
11	L	16 49.42	2.090	16 11 48.28	135.59	22 12 46.0	181.4	67.34	15 1.2	55 1.5	
12	U	5 14.75	2.131	16 39 10.58	138.09	-22 40 37.2	-96.3	67.99	15 6.3	55 20.2	I. N.
12	L	17 40.55	2.167	17 7 1.02	140.26	22 50 57.4	-6.3	68.55	15 12.0	55 41.3	
13	U	6 6.74	2.197	17 35 15.16	142.03	22 42 53.8	+87.4	68.99	15 18.4	56 4.8	I. N.S.
13	L	18 33.24	2.219	18 3 47.81	143.34	22 15 47.7	183.8	69.31	15 25.4	56 30.3	
14	U	6 59.95	2.233	18 32 33.41	144.19	-21 29 16.4	+281.3	69.51	15 32.8	56 57.7	I. S.
14	L	19 26.79	2.240	19 1 26.49	144.60	20 23 16.9	378.2	69.59	15 40.7	57 26.5	
15	U	7 53.68	2.240	19 30 22.23	144.64	18 58 7.6	472.7	69.57	15 48.8	57 56.3	I. S.
15	L	20 20.54	2.236	19 59 16.72	144.41	17 14 29.4	562.7	69.48	15 57.1	58 26.6	
16	U	8 47.34	2.230	20 28 7.44	144.02	-15 13 26.4	+646.5	69.35	16 5.2	58 56.6	I. S.
16	L	21 14.06	2.223	20 56 53.31	143.62	12 56 26.1	722.0	69.22	16 13.1	59 25.6	
17	U	9 40.71	2.218	21 25 34.85	143.33	10 25 19.0	787.3	69.12	16 20.6	59 52.9	I. S.
17	L	22 7.32	2.217	21 54 13.94	143.24	7 42 18.2	840.6	69.07	16 27.4	60 17.7	
18	U	10 33.94	2.221	22 22 53.75	143.46	-4 49 57.7	+890.3	69.10	16 33.2	60 39.1	I. S.
18	L	23 0.64	2.230	22 51 38.39	144.05	-1 51 10.5	904.9	69.22	16 37.9	60 56.5	
19	U	11 27.49	2.247	23 20 32.55	145.05	+1 10 53.2	913.0	69.46	16 41.4	61 9.2	I. N.S.
19	L	23 54.59	2.271	23 49 41.21	146.46	4 12 51.0	903.7	69.81	16 43.5	61 16.9	
20	U	12 22.01	2.300	0 19 8.99	148.22	+7 11 11.3	+876.7	70.25	16 44.1	61 19.3	II. N.
21	L	0 49.81	2.334	0 48 59.76	150.27	10 2 20.5	831.9	70.76	16 43.3	61 16.3	
21	U	13 18.03	2.370	1 19 16.04	152.46	12 42 48.4	770.0	71.31	16 41.1	61 8.2	II. N.
22	L	1 46.69	2.406	1 49 58.50	154.61	15 9 16.8	692.2	71.86	16 37.6	60 55.8	
22	U	14 15.76	2.438	2 21 5.52	156.51	+17 18 46.3	+600.5	72.35	16 32.9	60 38.1	II. N.
23	L	2 45.16	2.461	2 52 32.85	157.95	19 8 43.8	497.4	72.72	16 27.2	60 17.4	
23	U	15 14.79	2.474	3 24 13.67	158.72	20 37 10.6	386.0	72.94	16 20.8	59 53.8	II. N.
24	L	3 44.49	2.474	3 55 58.90	158.67	21 42 46.8	269.6	72.96	16 13.8	59 28.2	
24	U	16 14.09	2.457	4 27 37.94	157.68	+22 24 54.4	+151.8	72.75	16 6.5	59 1.2	II. N.
25	L	4 43.39	2.425	4 58 59.54	155.76	22 43 36.7	+35.9	72.31	15 59.0	58 33.6	
25	U	17 12.23	2.379	5 29 52.95	153.60	22 39 35.1	-75.1	71.66	15 51.5	58 6.0	II. N.
26	L	5 40.45	2.322	6 0 8.85	149.55	22 14 2.7	178.9	70.82	15 44.1	57 38.9	
26	U	18 7.92	2.256	6 29 40.02	145.59	+21 28 36.3	-273.9	69.84	15 37.0	57 12.8	II. S.
27	L	6 34.58	2.185	6 58 21.74	141.34	20 25 8.6	359.0	68.77	15 30.2	56 47.9	
27	U	19 0.37	2.113	7 26 11.83	137.02	19 5 40.5	433.9	67.65	15 23.8	56 24.6	II. S.
28	L	7 25.31	2.043	7 53 10.45	132.78	17 32 14.2	498.8	66.54	15 17.9	56 2.9	
28	U	19 49.42	1.977	8 19 19.63	128.79	+15 46 49.6	-553.8	65.47	15 12.5	55 43.0	II. S.
29	L	8 12.77	1.916	8 44 42.96	125.16	13 51 20.8	599.5	64.48	15 7.5	55 24.9	
29	U	20 35.44	1.863	9 9 25.12	121.94	11 47 35.6	636.6	63.59	15 3.1	55 8.6	II. S.
30	L	8 57.52	1.817	9 33 31.52	119.20	9 37 13.8	665.7	62.81	14 59.2	54 54.2	
30	U	21 19.10	1.780	9 57 7.99	116.96	+7 21 49.2	-687.2	62.17	14 55.7	54 41.4	II.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Oct. 23	U	15 58.19	2.389	6 6 1.52	153.58	+21 52 57.8	-206.9	71.70	15 57.2	58 27.0	II. N.S.
24	L	4 26.39	2.311	6 36 16.63	148.87	21 1 40.0	304.1	70.57	15 48.9	57 56.6	
24	U	16 53.62	2.227	7 5 33.12	143.86	19 52 6.4	389.5	69.35	15 40.8	57 26.9	II. S.
25	L	5 19.84	2.143	7 33 49.04	138.81	18 26 40.8	462.8	68.10	15 33.0	56 58.3	
25	U	17 45.07	2.062	8 1 5.30	133.94	+16 47 45.3	-524.6	66.86	15 25.6	56 31.8	II. S.
26	L	6 9.37	1.987	8 27 25.09	129.42	14 57 35.0	575.5	65.68	15 18.8	56 6.2	
26	U	18 32.80	1.920	8 52 53.30	125.36	12 58 13.8	616.5	64.60	15 12.5	55 43.2	II. S.
27	L	6 55.48	1.861	9 17 35.94	121.84	10 51 34.3	648.6	63.65	15 6.9	55 22.4	
27	U	19 17.51	1.812	9 41 39.70	118.88	+ 8 39 17.5	-672.8	62.83	15 1.9	55 4.0	II. S.
28	L	7 39.01	1.773	10 5 11.62	116.53	6 22 55.1	689.7	62.15	14 57.5	54 48.0	
28	U	20 0.10	1.744	10 28 18.82	114.77	4 3 49.8	700.1	61.63	14 53.7	54 34.3	II. S.
29	L	8 20.90	1.724	10 51 8.37	113.59	+ 1 43 18.4	704.1	61.27	14 50.6	54 22.9	
29	U	20 41.52	1.714	11 13 47.13	112.97	- 0 37 26.2	-702.3	61.07	14 48.1	54 13.7	II. S.
30	L	9 2.07	1.713	11 36 21.77	112.90	2 57 14.1	694.8	61.01	14 46.2	54 6.6	
30	U	21 22.65	1.720	11 58 58.61	113.33	5 14 55.8	681.3	61.10	14 44.8	54 1.5	II. S.
31	L	9 43.38	1.735	12 21 43.63	114.25	7 29 21.1	661.9	61.33	14 43.9	53 58.3	
31	U	22 4.33	1.758	12 44 42.34	115.61	- 9 39 17.9	-636.5	61.67	14 43.6	53 56.9	II. S.
Nov. 1	L	10 25.59	1.787	13 7 59.78	117.36	11 43 32.0	604.8	62.12	14 43.6	53 57.0	
1	U	22 47.23	1.822	13 31 40.29	119.44	13 40 46.1	566.4	62.67	14 44.0	53 58.7	
2	L	11 9.32	1.861	13 55 47.52	121.80	15 29 40.5	521.4	63.29	14 44.9	54 1.8	
2	U	23 31.90	1.903	14 20 24.13	124.33	-17 8 53.2	-499.5	63.96	14 46.1	54 6.3	
3	L	11 54.99	1.946	14 45 31.65	126.94	18 37 1.7	410.8	64.65	14 47.7	54 12.0	
4	U	0 18.60	1.989	15 11 10.49	129.53	19 52 44.6	345.3	65.33	14 49.6	54 19.0	
4	L	12 42.71	2.030	15 37 19.60	131.96	20 54 43.7	273.5	65.98	14 51.8	54 27.2	
5	U	1 7.29	2.066	16 3 56.56	134.15	-21 41 47.3	-196.2	66.56	14 54.4	54 36.7	I. N.
5	L	13 32.27	2.096	16 30 57.64	135.97	22 12 52.8	114.1	67.06	14 57.3	54 47.4	
6	U	1 57.57	2.119	16 58 18.00	137.34	22 27 9.9	- 28.3	67.44	15 0.6	54 59.4	I. N.
6	L	14 23.10	2.134	17 25 52.07	138.24	22 24 2.7	+ 59.8	67.70	15 4.2	55 12.7	
7	U	2 48.75	2.141	17 53 33.87	138.65	-22 3 12.3	+148.6	67.84	15 8.2	55 27.3	I. S.
7	L	15 14.44	2.140	18 21 17.64	138.58	21 24 36.5	237.1	67.86	15 12.5	55 43.2	
8	U	3 40.07	2.132	18 48 58.23	138.13	20 28 30.1	323.6	67.78	15 17.3	56 0.7	I. S.
8	L	16 5.59	2.120	19 16 31.63	137.40	19 15 24.2	406.8	67.62	15 22.4	56 19.6	
9	U	4 30.94	2.105	19 43 55.12	136.51	-17 46 4.1	+485.8	67.42	15 27.9	56 39.8	I. S.
9	L	16 56.11	2.090	20 11 7.60	135.59	16 1 27.8	559.4	67.21	15 33.8	57 1.3	
10	U	5 21.10	2.076	20 38 9.54	134.77	14 2 43.9	626.9	67.01	15 40.0	57 24.0	I. S.
10	L	17 45.95	2.067	21 5 3.03	134.19	11 51 11.7	687.3	66.87	15 46.4	57 47.6	
11	U	6 10.72	2.063	21 31 51.55	133.96	- 9 28 18.9	+740.1	66.81	15 53.0	58 11.9	I. S.
11	L	18 35.49	2.066	21 58 39.84	134.16	6 55 43.6	784.3	66.86	15 59.8	58 36.6	
12	U	7 0.35	2.078	22 25 33.71	134.90	4 15 14.7	818.9	67.03	16 6.5	59 1.1	I. S.
12	L	19 25.41	2.100	22 52 39.72	136.20	- 1 28 52.9	842.9	67.34	16 13.0	59 25.1	
13	U	7 50.79	2.132	23 20 4.96	138.11	+ 1 21 6.4	+854.9	67.80	16 19.2	59 47.8	I. S.
13	L	20 16.61	2.173	23 47 56.70	140.62	4 12 13.2	833.8	68.40	16 24.9	60 8.7	
14	U	8 42.99	2.224	0 16 22.01	143.69	7 1 39.5	838.0	69.14	16 29.9	60 27.1	I. S.
14	L	21 10.03	2.283	0 45 27.15	147.24	9 46 21.6	806.2	69.99	16 34.0	60 42.3	
15	U	9 37.81	2.348	1 15 17.04	151.12	+12 23 1.6	+757.5	70.92	16 37.1	60 53.7	I. S.

Oct. 23, U Defective Illumination of N. & 24.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Nov. 17, U Defective Illumination of H. 0°.02.
Nov. 17, U Defective Illumination of S. 0°.02.

Nov. 18, U Defective Illumination of S. 0°.02.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

MERCURY, 1918.

FOR TRANSIT AT WASHINGTON.
















VENUS, 1918.
FOR TRANSIT AT WASHINGTON.

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FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Oct. 1	23 3	11 45 11.98	+ 3 11 19.1	5.3	5.2	0.35	Nov. 14	23 37	15 12 48.91	-17 12 46.4	5.1	5.0	0.35
2	23 4	11 49 46.99	2 41 51.3	5.3	5.2	0.34	15	23 38	15 17 51.72	17 34 35.4	5.1	5.0	0.35
3	23 4	11 54 21.84	2 12 17.5	5.3	5.2	0.34	16	23 39	15 22 55.76	17 55 56.2	5.1	5.0	0.35
4	23 5	11 58 56.56	1 42 38.6	5.3	5.2	0.34	17	23 40	15 28 1.02	18 16 48.0	5.1	5.0	0.35
5	23 5	12 3 31.20	1 12 55.1	5.3	5.1	0.34	18	23 42	15 33 7.53	18 37 10.1	5.1	5.0	0.35
6	23 6	12 8 5.78	+ 0 43 7.9	5.3	5.1	0.34	19	23 43	15 38 15.27	-18 57 1.7	5.1	5.0	0.35
7	23 7	12 12 40.35	+ 0 13 17.8	5.3	5.1	0.34	20	23 44	15 43 24.24	19 16 21.9	5.1	5.0	0.35
8	23 7	12 17 14.94	- 0 16 34.7	5.3	5.1	0.34	21	23 45	15 48 34.44	19 35 10.1	5.1	5.0	0.35
9	23 8	12 21 49.60	0 46 28.6	5.3	5.1	0.34	22	23 46	15 53 45.86	19 53 25.5	5.1	5.0	0.35
10	23 9	12 26 24.37	1 16 23.2	5.3	5.1	0.34	23	23 48	15 58 58.49	20 11 7.5	5.1	5.0	0.36
11	23 9	12 30 59.27	- 1 46 18.0	5.2	5.1	0.34	24	23 49	16 4 12.32	-20 28 15.2	5.1	5.0	0.36
12	23 10	12 35 34.37	2 16 12.1	5.2	5.1	0.34	25	23 50	16 9 27.31	20 44 47.9	5.1	5.0	0.36
13	23 11	12 40 9.68	2 46 4.6	5.2	5.1	0.34	26	23 52	16 14 43.47	21 0 45.0	5.1	5.0	0.36
14	23 11	12 44 45.27	3 15 55.0	5.2	5.1	0.34	27	23 53	16 20 0.75	21 16 5.7	5.1	5.0	0.36
15	23 12	12 49 21.15	3 45 42.4	5.2	5.1	0.34	28	23 54	16 25 19.14	21 30 49.5	5.1	5.0	0.36
16	23 13	12 53 57.38	- 4 15 26.1	5.2	5.1	0.34	29	23 56	16 30 38.60	-21 44 55.7	5.1	5.0	0.36
17	23 13	12 58 34.00	4 45 5.4	5.2	5.1	0.34	30	23 57	16 35 59.11	21 58 23.7	5.1	5.0	0.36
18	23 14	13 3 11.07	5 14 39.5	5.2	5.1	0.34	Dec. 1	23 58	16 41 20.61	22 11 12.7	5.1	5.0	0.36
19	23 15	13 7 48.61	5 44 7.6	5.2	5.1	0.34	3	0 0	16 46 43.09	22 23 22.4	5.2	5.0	0.36
20	23 15	13 12 26.66	6 13 29.1	5.2	5.1	0.34	4	0 1	16 52 6.49	22 34 52.1	5.2	5.0	0.36
21	23 16	13 17 5.26	- 6 42 43.0	5.2	5.0	0.34	5	0 3	16 57 30.77	-22 45 41.2	5.2	5.0	0.36
22	23 17	13 21 44.48	7 11 48.9	5.2	5.0	0.34	6	0 4	17 2 55.88	22 55 49.3	5.2	5.0	0.36
23	23 17	13 26 24.33	7 40 45.8	5.2	5.0	0.34	7	0 6	17 8 21.78	23 5 16.0	5.2	5.0	0.36
24	23 18	13 31 4.86	8 9 32.9	5.2	5.0	0.34	8	0 7	17 13 48.40	23 14 0.7	5.2	5.0	0.36
25	23 19	13 35 46.12	8 38 9.4	5.2	5.0	0.34	9	0 9	17 19 15.71	23 22 3.0	5.2	5.0	0.36
26	23 20	13 40 28.12	- 9 6 34.5	5.2	5.0	0.34	10	0 10	17 24 43.63	-23 29 22.6	5.2	5.0	0.36
27	23 20	13 45 10.91	9 34 47.6	5.2	5.0	0.34	11	0 12	17 30 12.11	23 35 59.1	5.2	5.0	0.36
28	23 21	13 49 54.52	10 2 47.8	5.2	5.0	0.34	12	0 13	17 35 41.10	23 41 52.2	5.2	5.0	0.37
29	23 22	13 54 38.99	10 30 34.1	5.2	5.0	0.34	13	0 15	17 41 10.54	23 47 1.5	5.2	5.0	0.37
30	23 23	13 59 24.35	10 58 5.8	5.2	5.0	0.34	14	0 16	17 46 40.37	23 51 26.9	5.2	5.0	0.37
31	23 24	14 4 10.63	-11 25 22.3	5.2	5.0	0.34	15	0 18	17 52 10.52	-23 55 8.2	5.2	5.0	0.37
Nov. 1	23 24	14 8 57.85	11 52 22.6	5.2	5.0	0.34	16	0 20	17 57 40.94	23 58 4.9	5.2	5.0	0.37
2	23 25	14 13 46.05	12 19 5.9	5.2	5.0	0.34	17	0 21	18 3 11.57	24 0 17.1	5.2	5.0	0.37
3	23 26	14 18 35.25	12 45 31.4	5.2	5.0	0.34	18	0 23	18 8 42.34	24 1 44.7	5.2	5.0	0.37
4	23 27	14 23 25.48	13 11 38.3	5.2	5.0	0.34	19	0 24	18 14 13.18	24 2 27.3	5.2	5.0	0.37
5	23 28	14 28 16.75	-13 37 25.8	5.2	5.0	0.34	20	0 26	18 19 44.05	-24 2 25.1	5.2	5.0	0.37
6	23 29	14 33 9.11	14 2 53.1	5.1	5.0	0.34	21	0 27	18 25 14.87	24 1 38.0	5.2	5.0	0.37
7	23 30	14 38 2.56	14 27 59.3	5.1	5.0	0.34	22	0 29	18 30 45.56	24 0 5.9	5.2	5.0	0.37
8	23 31	14 42 57.12	14 52 43.7	5.1	5.0	0.35	23	0 30	18 36 16.10	23 57 49.1	5.2	5.0	0.37
9	23 32	14 47 52.83	15 17 5.5	5.1	5.0	0.35	24	0 32	18 41 46.38	23 54 47.6	5.2	5.1	0.37
10	23 33	14 52 49.68	-15 41 3.7	5.1	5.0	0.35	25	0 34	18 47 16.37	-23 51 1.3	5.2	5.1	0.37
11	23 34	14 57 47.70	16 4 37.8	5.1	5.0	0.35	26	0 35	18 52 45.99	23 46 30.7	5.2	5.1	0.37
12	23 35	15 2 46.90	16 27 46.8	5.1	5.0	0.35	27	0 37	18 58 15.17	23 41 15.7	5.2	5.1	0.37
13	23 36	15 7 47.30	16 50 29.9	5.1	5.0	0.35	28	0 38	19 3 43.85	23 35 16.6	5.2	5.1	0.37
14	23 37	15 12 48.91	17 12 46.4	5.1	5.0	0.35	29	0 40	19 9 11.98	23 28 33.7	5.2	5.1	0.37
15	23 38	15 17 51.72	-17 34 35.4	5.1	5.0	0.35	30	0 41	19 14 39.50	-23 21 7.3	5.2	5.1	0.37
16	23 39	15 22 55.76	-17 55 56.2	5.1	5.0	0.35	31	0 43	19 20 6.34	-23 12 57.6	5.2	5.1	0.37

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Jan. 0	17 13	11 54 1.17	+3 35 35.2	7.7	4.4	0.30	Feb. 15	14 32	12 13 35.55	+2 36 17.2	11.6	6.7	0.44
1	17 10	11 55 12.33	3 29 18.5	7.8	4.5	0.30	16	14 27	12 13 0.57	2 41 10.2	11.7	6.7	0.45
2	17 8	11 56 22.01	3 23 12.1	7.9	4.5	0.30	17	14 23	12 12 22.70	2 46 18.9	11.8	6.8	0.45
3	17 5	11 57 30.17	3 17 15.8	7.9	4.6	0.30	18	14 18	12 11 41.98	2 51 43.1	11.9	6.8	0.46
4	17 2	11 58 36.79	3 11 30.1	8.0	4.6	0.31	19	14 13	12 10 58.42	2 57 22.2	12.0	6.9	0.46
5	16 59	11 59 41.82	+3 5 55.4	8.1	4.6	0.31	20	14 9	12 10 12.06	+3 3 16.1	12.1	6.9	0.46
6	16 56	12 0 45.22	3 0 31.8	8.1	4.7	0.31	21	14 4	12 9 22.93	3 9 24.3	12.2	7.0	0.47
7	16 53	12 1 46.98	2 55 19.4	8.2	4.7	0.32	22	13 59	12 8 31.06	3 15 46.3	12.2	7.0	0.47
8	16 50	12 2 47.03	2 50 18.6	8.3	4.8	0.32	23	13 54	12 7 36.52	3 22 21.8	12.3	7.1	0.47
9	16 47	12 3 45.35	2 45 29.6	8.4	4.8	0.32	24	13 49	12 6 39.34	3 29 10.2	12.4	7.1	0.47
10	16 44	12 4 41.89	+2 40 52.7	8.4	4.8	0.32	25	13 44	12 5 39.58	+3 36 10.9	12.5	7.2	0.48
11	16 41	12 5 36.62	2 36 28.2	8.5	4.9	0.33	26	13 39	12 4 37.32	3 43 23.2	12.5	7.2	0.48
12	16 38	12 6 29.49	2 32 16.1	8.6	4.9	0.33	27	13 34	12 3 32.62	3 50 46.7	12.6	7.2	0.48
13	16 35	12 7 20.47	2 28 16.7	8.7	5.0	0.33	28	13 29	12 2 25.56	3 58 20.6	12.7	7.3	0.49
14	16 32	12 8 9.53	2 24 30.3	8.7	5.0	0.33	Mar. 1	13 24	12 1 16.22	4 6 4.2	12.7	7.3	0.49
15	16 29	12 8 56.62	+2 20 57.1	8.8	5.1	0.34	2	13 19	12 0 4.69	+4 13 56.7	12.8	7.4	0.49
16	16 26	12 9 41.71	2 17 37.1	8.9	5.1	0.34	3	13 14	11 58 51.07	4 21 57.3	12.9	7.4	0.49
17	16 22	12 10 24.78	2 14 30.6	9.0	5.2	0.34	4	13 9	11 57 35.47	4 30 5.1	12.9	7.4	0.50
18	16 19	12 11 5.77	2 11 37.9	9.1	5.2	0.35	5	13 4	11 56 18.00	4 38 19.3	13.0	7.4	0.50
19	16 16	12 11 44.65	2 8 59.0	9.1	5.2	0.35	6	12 58	11 54 58.79	4 46 38.8	13.0	7.5	0.50
20	16 13	12 12 21.39	+2 6 34.1	9.2	5.3	0.35	7	12 53	11 53 37.96	+4 55 2.7	13.1	7.5	0.50
21	16 9	12 12 55.96	2 4 23.5	9.3	5.3	0.36	8	12 48	11 52 15.64	5 3 30.0	13.1	7.5	0.50
22	16 6	12 13 28.30	2 2 27.4	9.4	5.4	0.36	9	12 42	11 50 51.99	5 11 59.7	13.2	7.5	0.51
23	16 2	12 13 58.39	2 0 46.0	9.5	5.4	0.36	10	12 37	11 49 27.15	5 20 30.6	13.2	7.6	0.51
24	15 59	12 14 26.17	1 59 19.6	9.6	5.5	0.37	11	12 32	11 48 1.27	5 29 1.6	13.2	7.6	0.51
25	15 55	12 14 51.62	+1 58 8.3	9.7	5.5	0.37	12	12 26	11 46 34.53	+5 37 31.6	13.2	7.6	0.51
26	15 52	12 15 14.69	1 57 12.4	9.7	5.6	0.37	13	12 21	11 45 7.09	5 45 59.6	13.3	7.6	0.51
27	15 48	12 15 35.33	1 56 32.1	9.8	5.6	0.38	14	12 16	11 43 39.12	5 54 24.3	13.3	7.6	0.51
28	15 45	12 15 53.50	1 56 7.5	9.9	5.7	0.38	15	12 10	11 42 10.81	6 2 44.7	13.3	7.6	0.51
29	15 41	12 16 9.16	1 55 58.9	10.0	5.8	0.38	16	12 5	11 40 42.32	6 10 59.8	13.3	7.6	0.51
30	15 37	12 16 22.26	+1 56 6.5	10.1	5.8	0.39	17	11 59	11 39 13.81	+6 19 8.3	13.3	7.6	0.51
31	15 34	12 16 32.77	1 56 30.3	10.2	5.9	0.39	18	11 54	11 37 45.47	6 27 9.3	13.3	7.6	0.51
Feb. 1	15 30	12 16 40.63	1 57 10.6	10.3	5.9	0.39	19	11 49	11 36 17.45	6 35 2.0	13.3	7.6	0.51
2	15 26	12 16 45.82	1 58 7.7	10.4	6.0	0.40	20	11 43	11 34 49.92	6 42 45.5	13.3	7.6	0.51
3	15 22	12 16 48.30	1 59 21.7	10.5	6.0	0.40	21	11 38	11 33 23.04	6 50 18.7	13.3	7.6	0.51
4	15 18	12 16 48.02	+2 0 52.5	10.6	6.1	0.40	22	11 32	11 31 56.97	+6 57 41.0	13.3	7.6	0.51
5	15 14	12 16 44.94	2 2 40.4	10.7	6.1	0.41	23	11 27	11 30 31.85	7 4 51.5	13.2	7.6	0.51
6	15 10	12 16 39.04	2 4 45.4	10.8	6.2	0.41	24	11 22	11 29 7.84	7 11 49.4	13.2	7.6	0.51
7	15 6	12 16 30.30	2 7 7.6	10.9	6.2	0.42	25	11 17	11 27 45.07	7 18 34.1	13.2	7.6	0.51
8	15 2	12 16 18.67	2 9 47.1	10.9	6.3	0.42	26	11 11	11 26 23.69	7 25 4.7	13.1	7.5	0.51
9	14 58	12 16 4.13	+2 12 43.6	11.0	6.3	0.42	27	11 6	11 25 3.84	+7 31 20.9	13.1	7.5	0.51
10	14 53	12 15 46.69	2 15 57.3	11.1	6.4	0.43	28	11 1	11 23 45.62	7 37 21.9	13.1	7.5	0.50
11	14 49	12 15 26.32	2 19 27.9	11.2	6.5	0.43	29	10 56	11 22 29.17	7 43 7.3	13.0	7.5	0.50
12	14 45	12 15 3.01	2 23 15.4	11.3	6.5	0.43	30	10 50	11 21 14.60	7 48 36.5	13.0	7.4	0.50
13	14 41	12 14 36.78	2 27 19.6	11.4	6.6	0.44	31	10 45	11 20 2.03	7 53 49.1	12.9	7.4	0.50
14	14 36	12 14 7.62	+2 31 40.3	11.5	6.6	0.44	Apr. 1	10 40	11 18 51.55	+7 58 44.7	12.9	7.4	0.50
15	14 32	12 13 35.55	+2 36 17.2	11.6	6.7	0.44	2	10 35	11 17 43.27	+8 3 23.0	12.8	7.4	0.49

Stellar magnitude at opposition in March, 1918, -1.1.

FOR TRANSIT AT WASHINGTON.

JUPITER, 1918.

FOR TRANSIT AT WASHINGTON.



Stellar magnitude at opposition in November, 1917, -2.4.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Oct. 1	18 20	7 1 33.72	+22 32 41.1	1.7	18.3	1.41	Nov. 15	15 29	7 7 28.84	+22 28 11.5	2.0	20.9	1.61
2	18 17	7 1 58.79	22 32 9.4	1.7	18.3	1.41	16	15 25	7 7 17.57	22 28 36.8	2.0	21.0	1.61
3	18 13	7 2 23.16	22 31 38.5	1.7	18.4	1.41	17	15 21	7 7 5.47	22 29 3.5	2.0	21.0	1.62
4	18 10	7 2 46.82	22 31 8.4	1.7	18.4	1.42	18	15 17	7 6 52.56	22 29 31.5	2.0	21.1	1.62
5	18 6	7 3 9.77	22 30 39.2	1.7	18.5	1.42	19	15 12	7 6 38.82	22 30 0.8	2.0	21.1	1.62
6	18 2	7 3 32.00	+22 30 11.0	1.7	18.6	1.43	20	15 8	7 6 24.27	+22 30 31.2	2.0	21.2	1.63
7	17 59	7 3 53.49	22 29 43.8	1.7	18.6	1.43	21	15 4	7 6 8.92	22 31 3.0	2.0	21.2	1.63
8	17 55	7 4 14.25	22 29 17.6	1.7	18.7	1.43	22	15 0	7 5 52.77	22 31 36.1	2.0	21.3	1.64
9	17 52	7 4 34.28	22 28 52.3	1.8	18.7	1.44	23	14 56	7 5 35.82	22 32 10.3	2.0	21.3	1.64
10	17 48	7 4 53.56	22 28 28.1	1.8	18.8	1.44	24	14 52	7 5 18.08	22 32 45.7	2.0	21.4	1.64
11	17 44	7 5 12.08	+22 28 4.9	1.8	18.8	1.45	25	14 47	7 4 59.57	+22 33 22.1	2.0	21.4	1.65
12	17 41	7 5 29.85	22 27 42.9	1.8	18.9	1.45	26	14 43	7 4 40.29	22 33 59.6	2.0	21.5	1.65
13	17 37	7 5 46.86	22 27 21.9	1.8	19.0	1.46	27	14 39	7 4 20.25	22 34 38.3	2.0	21.5	1.66
14	17 33	7 6 3.09	22 27 2.0	1.8	19.0	1.46	28	14 34	7 3 59.46	22 35 18.0	2.0	21.6	1.66
15	17 30	7 6 18.54	22 26 43.3	1.8	19.1	1.47	29	14 30	7 3 37.94	22 35 58.6	2.0	21.6	1.67
16	17 26	7 6 33.22	+22 26 25.8	1.8	19.1	1.47	30	14 26	7 3 15.71	+22 36 40.2	2.0	21.7	1.67
17	17 22	7 6 47.12	22 26 9.5	1.8	19.2	1.47	Dec. 1	14 22	7 2 52.77	22 37 22.7	2.0	21.7	1.67
18	17 19	7 7 0.23	22 25 54.4	1.8	19.3	1.48	2	14 17	7 2 29.13	22 38 6.1	2.0	21.8	1.68
19	17 15	7 7 12.54	22 25 40.5	1.8	19.3	1.48	3	14 13	7 2 4.82	22 38 50.3	2.0	21.8	1.68
20	17 11	7 7 24.06	22 25 28.0	1.8	19.4	1.49	4	14 9	7 1 39.84	22 39 35.3	2.0	21.9	1.68
21	17 7	7 7 34.76	+22 25 16.7	1.8	19.4	1.49	5	14 4	7 1 14.22	+22 40 21.0	2.0	21.9	1.69
22	17 4	7 7 44.66	22 25 6.8	1.8	19.5	1.50	6	14 0	7 0 47.97	22 41 7.4	2.0	21.9	1.69
23	17 0	7 7 53.73	22 24 58.1	1.8	19.6	1.50	7	13 56	7 0 21.10	22 41 54.4	2.1	22.0	1.69
24	16 56	7 8 1.99	22 24 50.7	1.8	19.6	1.51	8	13 51	6 59 53.64	22 42 42.0	2.1	22.0	1.70
25	16 52	7 8 9.41	22 24 44.8	1.8	19.7	1.51	9	13 47	6 59 25.61	22 43 30.1	2.1	22.0	1.70
26	16 48	7 8 16.00	+22 24 40.2	1.8	19.7	1.52	10	13 42	6 58 57.05	+22 44 18.8	2.1	22.1	1.70
27	16 45	7 8 21.76	22 24 37.1	1.8	19.8	1.52	11	13 38	6 58 27.95	22 45 7.9	2.1	22.1	1.70
28	16 41	7 8 26.67	22 24 35.5	1.9	19.8	1.52	12	13 34	6 57 58.33	22 45 57.4	2.1	22.1	1.70
29	16 37	7 8 30.73	22 24 35.3	1.9	19.9	1.53	13	13 29	6 57 28.21	22 46 47.3	2.1	22.2	1.71
30	16 33	7 8 33.94	22 24 36.5	1.9	20.0	1.53	14	13 25	6 56 57.63	22 47 37.5	2.1	22.2	1.71
31	16 29	7 8 36.29	+22 24 39.1	1.9	20.0	1.54	15	13 20	6 56 26.61	+22 48 27.8	2.1	22.2	1.71
Nov. 1	16 25	7 8 37.79	22 24 43.1	1.9	20.1	1.54	16	13 16	6 55 55.16	22 49 18.3	2.1	22.2	1.71
2	16 21	7 8 38.44	22 24 48.6	1.9	20.2	1.55	17	13 11	6 55 23.31	22 50 9.1	2.1	22.3	1.72
3	16 17	7 8 38.22	22 24 55.5	1.9	20.2	1.55	18	13 7	6 54 51.07	22 50 59.9	2.1	22.3	1.72
4	16 13	7 8 37.15	22 25 4.0	1.9	20.3	1.56	19	13 2	6 54 18.46	22 51 50.9	2.1	22.3	1.72
5	16 9	7 8 35.21	+22 25 13.9	1.9	20.3	1.56	20	12 58	6 53 45.51	+22 52 41.8	2.1	22.3	1.72
6	16 5	7 8 32.42	22 25 25.2	1.9	20.4	1.57	21	12 53	6 53 12.24	22 53 32.8	2.1	22.4	1.72
7	16 1	7 8 28.76	22 25 38.1	1.9	20.5	1.57	22	12 49	6 52 38.68	22 54 23.7	2.1	22.4	1.72
8	15 57	7 8 24.25	22 25 52.4	1.9	20.5	1.58	23	12 44	6 52 4.87	22 55 14.4	2.1	22.4	1.73
9	15 53	7 8 18.88	22 26 8.1	1.9	20.6	1.58	24	12 40	6 51 30.81	22 56 5.0	2.1	22.4	1.73
10	15 49	7 8 12.65	+22 26 25.2	1.9	20.6	1.58	25	12 35	6 50 56.51	+22 56 55.5	2.1	22.4	1.73
11	15 45	7 8 5.57	22 26 43.7	1.9	20.7	1.59	26	12 31	6 50 22.03	22 57 45.8	2.1	22.4	1.73
12	15 41	7 7 57.65	22 27 3.6	1.9	20.7	1.59	27	12 26	6 49 47.40	22 58 35.9	2.1	22.4	1.73
13	15 37	7 7 48.88	22 27 24.9	1.9	20.8	1.60	28	12 22	6 49 12.61	22 59 25.7	2.1	22.4	1.73
14	15 33	7 7 39.27	22 27 47.5	2.0	20.9	1.60	29	12 17	6 48 37.71	23 0 15.1	2.1	22.4	1.73
15	15 29	7 7 28.84	+22 28 11.5	2.0	20.9	1.61	30	12 13	6 48 2.73	+23 1 4.0	2.1	22.4	1.73
16	15 25	7 7 17.57	+22 28 36.8	2.0	21.0	1.61	31	12 8	6 47 27.69	+23 1 52.6	2.1	22.4	1.73

Stellar magnitude at opposition in January, 1919, -2.3.

FOR TRANSIT AT WASHINGTON.

Date	Watch Mean Time		Apparent Right Ascension			Apparent Longitude	Hor. Par.
	h	m	h	m	s		
Jan.	0	14 24	0	4 20.74		+17 34 51	
	1	14 20	0	4 0.11		17 36 3	
	2	14 16	0	3 51.19		17 37 16	S
	3	14 11	0	3 36 06		17 38 30	
	4	14 7	0	3 20 43		17 39 46	
	5	14 3	0	3 4 02		+17 41 2	
	6	13 59	0	2 48.53		17 42 20	
	7	13 51	0	2 32.19		17 43 38	S
	8	13 50	0	2 16.57		17 44 58	S
	9	13 46	0	1 58 72		17 46 18	
	10	13 42	0	1 41.62		+17 47 39	S
	11	13 38	0	1 24 27		17 49 1	
	12	13 33	0	1 0 72		17 50 24	S
	13	13 29	0	0 48 96		17 51 47	S
Feb.	14	13 25	0	0 31.00		17 53 11	
	15	13 21	0	0 12.85		+17 54 35	
	16	13 16	8 59 54	52		17 56 0.4	1.1
	17	13 12	8 59 36	03		17 57 25 8	1.1 S
	18	13 8	8 59 17	37		17 58 51.7	1.1
	19	13 4	8 58 58	56		18 0 17 9	1.1
	20	12 59	8 58 39	64		+18 1 44 3	1.1
	21	12 55	8 58 20	58		18 3 11 1	1.1
	22	12 51	8 58 1 42			18 4 38 0	1.1
	23	12 47	8 57 42 15			18 6 5 1	1.1
	24	12 42	8 57 22 78			18 7 32 4	1.1
	25	12 38	8 57 3 34			+18 8 59 8	1.1
	26	12 34	8 56 43 88			18 10 27 1	1.1
	27	12 30	8 56 24 23			18 11 54 5	1.1
	28	12 25	8 56 4 68			18 13 21 8	1.1
	29	12 21	8 55 44 97			18 14 48 8	1.1
	30	12 17	8 55 25 27			+18 16 15 9	1.1
	31	12 13	8 55 5 57			18 17 42 8	1.1
	1	12 9	8 54 46 87			18 19 9 7	1.1
	2	12 5	8 54 27 17			18 20 28 6	1.1
	3	12 1	8 54 7 47			18 22 1 5	1.1
	4	11 57	8 53 48 74			+18 23 27	1.1
	5	11 53	8 53 29 27			18 24 52 1	1.1
	6	11 49	8 53 10 1			18 26 27 0	1.1
	7	11 45	8 52 50 51			18 28 0 0	1.1
	8	11 41	8 52 31 21			18 29 25 0	1.1
	9	11 37	8 52 12 1			18 31 0 0	1.1
	10	11 33	8 51 52 51			18 32 25 0	1.1
	11	11 29	8 51 33 51			18 34 0 0	1.1
	12	11 25	8 51 14 51			18 35 25 0	1.1
	13	11 21	8 50 55 51			18 37 0 0	1.1
	14	11 17	8 50 36 51			18 38 25 0	1.1
	15	11 13	8 50 17 51			18 40 0 0	1.1
	16	11 9	8 49 58 51			18 41 25 0	1.1
	17	11 5	8 49 39 51			18 43 0 0	1.1
	18	10 51	8 49 20 51			18 44 25 0	1.1
	19	10 47	8 49 1 51			18 46 0 0	1.1
	20	10 43	8 48 42 51			18 47 25 0	1.1
	21	10 39	8 48 23 51			18 49 0 0	1.1
	22	10 35	8 48 4 51			18 50 25 0	1.1
	23	10 31	8 47 45 51			18 52 0 0	1.1
	24	10 27	8 47 26 51			18 53 25 0	1.1
	25	10 23	8 47 7 51			18 55 0 0	1.1
	26	10 19	8 46 48 51			18 56 25 0	1.1
	27	10 15	8 46 29 51			18 58 0 0	1.1
	28	10 11	8 46 10 51			18 59 25 0	1.1
	29	10 7	8 45 51 51			19 0 50 0	1.1
	30	10 3	8 45 32 51			19 0 25 0	1.1

FOR TRANSIT AT WASHINGTON.

URANUS, 1918.
FOR TRANSIT AT WASHINGTON.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Sept. 10	10 32	21 49 41.17	-13 57 57.8	0.5	1.8	0.12	Oct. 26	7 27	21 45 34.34	-14 17 51.6	0.5	1.7	0.12
11	10 28	21 49 32.88	13 58 39.7	0.5	1.8	0.12	27	7 23	21 45 32.87	14 17 56.9	0.5	1.7	0.12
12	10 24	21 49 24.69	13 59 21.2	0.5	1.8	0.12	28	7 19	21 45 31.59	14 18 1.2	0.5	1.7	0.12
13	10 20	21 49 16.59	14 0 2.2	0.5	1.8	0.12	29	7 15	21 45 30.51	14 18 4.5	0.5	1.7	0.12
14	10 16	21 49 8.57	14 0 42.7	0.5	1.8	0.12	30	7 12	21 45 29.63	14 18 6.8	0.5	1.7	0.12
15	10 12	21 49 0.66	-14 1 22.5	0.5	1.8	0.12	31	7 8	21 45 28.94	-14 18 8.1	0.5	1.7	0.12
16	10 8	21 48 52.85	14 2 1.8	0.5	1.8	0.12	Nov. 1	7 4	21 45 28.44	14 18 8.4	0.5	1.7	0.12
17	10 4	21 48 45.13	14 2 40.5	0.5	1.8	0.12	2	7 0	21 45 28.14	14 18 7.7	0.5	1.7	0.12
18	10 0	21 48 37.53	14 3 18.6	0.5	1.8	0.12	3	6 56	21 45 28.04	14 18 5.9	0.4	1.7	0.12
19	9 56	21 48 30.03	14 3 56.1	0.5	1.8	0.12	4	6 52	21 45 28.14	14 18 3.1	0.4	1.7	0.12
20	9 52	21 48 22.65	-14 4 32.9	0.5	1.8	0.12	5	6 48	21 45 28.44	-14 17 59.3	0.4	1.7	0.12
21	9 48	21 48 15.37	14 5 9.2	0.5	1.8	0.12	6	6 44	21 45 28.93	14 17 54.5	0.4	1.7	0.12
22	9 44	21 48 8.22	14 5 44.7	0.5	1.8	0.12	7	6 40	21 45 29.63	14 17 48.7	0.4	1.7	0.12
23	9 40	21 48 1.19	14 6 19.6	0.5	1.8	0.12	8	6 36	21 45 30.53	14 17 41.8	0.4	1.7	0.12
24	9 35	21 47 54.28	14 6 53.7	0.5	1.8	0.12	9	6 32	21 45 31.62	14 17 33.8	0.4	1.7	0.12
25	9 31	21 47 47.50	-14 7 27.2	0.5	1.7	0.12	10	6 28	21 45 32.91	-14 17 25.0	0.4	1.7	0.12
26	9 27	21 47 40.86	14 8 0.0	0.5	1.7	0.12	11	6 24	21 45 34.40	14 17 15.1	0.4	1.7	0.12
27	9 23	21 47 34.34	14 8 32.0	0.5	1.7	0.12	12	6 20	21 45 36.09	14 17 4.2	0.4	1.7	0.12
28	9 19	21 47 27.96	14 9 3.3	0.5	1.7	0.12	13	6 17	21 45 37.98	14 16 52.3	0.4	1.7	0.12
29	9 15	21 47 21.72	14 9 33.8	0.5	1.7	0.12	14	6 13	21 45 40.06	14 16 39.4	0.4	1.7	0.12
30	9 11	21 47 15.61	-14 10 3.6	0.5	1.7	0.12	15	6 9	21 45 42.34	-14 16 25.4	0.4	1.7	0.12
Oct. 1	9 7	21 47 9.65	14 10 32.6	0.5	1.7	0.12	16	6 5	21 45 44.82	14 16 10.4	0.4	1.7	0.12
2	9 3	21 47 3.84	14 11 0.7	0.5	1.7	0.12	17	6 1	21 45 47.50	14 15 54.4	0.4	1.7	0.11
3	8 59	21 46 58.17	14 11 28.1	0.5	1.7	0.12	18	5 57	21 45 50.36	14 15 37.5	0.4	1.7	0.11
4	8 55	21 46 52.66	14 11 54.7	0.5	1.7	0.12	19	5 53	21 45 53.43	14 15 19.6	0.4	1.7	0.11
5	8 51	21 46 47.31	-14 12 20.4	0.5	1.7	0.12	20	5 49	21 45 56.69	-14 15 0.7	0.4	1.7	0.11
6	8 47	21 46 42.11	14 12 45.2	0.5	1.7	0.12	21	5 46	21 46 0.14	14 14 40.7	0.4	1.7	0.11
7	8 43	21 46 37.08	14 13 9.2	0.5	1.7	0.12	22	5 42	21 46 3.80	14 14 19.9	0.4	1.7	0.11
8	8 39	21 46 32.21	14 13 32.3	0.5	1.7	0.12	23	5 38	21 46 7.64	14 13 58.0	0.4	1.7	0.11
9	8 35	21 46 27.50	14 13 54.6	0.5	1.7	0.12	24	5 34	21 46 11.67	14 13 35.1	0.4	1.7	0.11
10	8 31	21 46 22.96	-14 14 15.9	0.5	1.7	0.12	25	5 30	21 46 15.90	-14 13 11.2	0.4	1.7	0.11
11	8 27	21 46 18.59	14 14 36.5	0.5	1.7	0.12	26	5 26	21 46 20.31	14 12 46.4	0.4	1.7	0.11
12	8 23	21 46 14.39	14 14 56.0	0.5	1.7	0.12	27	5 22	21 46 24.92	14 12 20.6	0.4	1.7	0.11
13	8 19	21 46 10.35	14 15 14.7	0.5	1.7	0.12	28	5 18	21 46 29.72	14 11 53.8	0.4	1.7	0.11
14	8 15	21 46 6.50	14 15 32.4	0.5	1.7	0.12	29	5 15	21 46 34.71	14 11 26.1	0.4	1.7	0.11
15	8 11	21 46 2.83	-14 15 49.2	0.5	1.7	0.12	30	5 11	21 46 39.88	-14 10 57.4	0.4	1.7	0.11
16	8 7	21 45 59.33	14 16 5.1	0.5	1.7	0.12	Dec. 1	5 7	21 46 45.24	14 10 27.7	0.4	1.7	0.11
17	8 3	21 45 56.00	14 16 20.0	0.5	1.7	0.12	2	5 3	21 46 50.79	14 9 57.1	0.4	1.7	0.11
18	7 59	21 45 52.86	14 16 34.1	0.5	1.7	0.12	3	4 59	21 46 56.52	14 9 25.6	0.4	1.6	0.11
19	7 55	21 45 49.89	14 16 47.2	0.5	1.7	0.12	4	4 55	21 47 2.43	14 8 53.1	0.4	1.6	0.11
20	7 51	21 45 47.11	-14 16 59.3	0.5	1.7	0.12	5	4 51	21 47 8.52	-14 8 19.7	0.4	1.6	0.11
21	7 47	21 45 44.52	14 17 10.4	0.5	1.7	0.12	6	4 48	21 47 14.79	14 7 45.4	0.4	1.6	0.11
22	7 43	21 45 42.11	14 17 20.6	0.5	1.7	0.12	7	4 44	21 47 21.24	14 7 10.2	0.4	1.6	0.11
23	7 39	21 45 39.88	14 17 29.8	0.5	1.7	0.12	8	4 40	21 47 27.86	14 6 34.1	0.4	1.6	0.11
24	7 35	21 45 37.84	14 17 38.1	0.5	1.7	0.12	9	4 36	21 47 34.67	14 5 57.1	0.4	1.6	0.11
25	7 31	21 45 35.99	-14 17 45.3	0.5	1.7	0.12	10	4 32	21 47 41.65	-14 5 19.2	0.4	1.6	0.11
26	7 27	21 45 34.34	-14 17 51.6	0.5	1.7	0.12	11	4 29	21 47 48.79	-14 4 40.5	0.4	1.6	0.11

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Jan. 0	13 54	8 34 58.58	+18 31 0.0	0.3	1.3	0.09	Feb. 15	10 49	8 29 53.12	+18 49 51.7	0.3	1.3	0.09
1	13 50	8 34 52.56	18 31 22.6	0.3	1.3	0.09	16	10 45	8 29 46.83	18 50 14.9	0.3	1.3	0.09
2	13 46	8 34 46.47	18 31 45.4	0.3	1.3	0.09	17	10 40	8 29 40.60	18 50 37.8	0.3	1.3	0.09
3	13 42	8 34 40.32	18 32 8.4	0.3	1.3	0.09	18	10 36	8 29 34.43	18 51 0.4	0.3	1.3	0.09
4	13 38	8 34 34.10	18 32 31.7	0.3	1.3	0.09	19	10 32	8 29 28.32	18 51 22.9	0.3	1.3	0.09
5	13 34	8 34 27.82	+18 32 55.1	0.3	1.3	0.09	20	10 28	8 29 22.27	+18 51 45.1	0.3	1.3	0.09
6	13 30	8 34 21.49	18 33 18.8	0.3	1.3	0.09	21	10 24	8 29 16.29	18 52 7.1	0.3	1.3	0.09
7	13 26	8 34 15.11	18 33 42.6	0.3	1.3	0.09	22	10 20	8 29 10.38	18 52 28.8	0.3	1.3	0.09
8	13 22	8 34 8.67	18 34 6.6	0.3	1.3	0.09	23	10 16	8 29 4.55	18 52 50.3	0.3	1.3	0.09
9	13 18	8 34 2.19	18 34 30.8	0.3	1.3	0.09	24	10 12	8 28 58.79	18 53 11.4	0.3	1.3	0.09
10	13 14	8 33 55.66	+18 34 55.1	0.3	1.3	0.09	25	10 8	8 28 53.11	+18 53 32.4	0.3	1.3	0.09
11	13 10	8 33 49.08	18 35 19.7	0.3	1.3	0.09	26	10 4	8 28 47.51	18 53 53.0	0.3	1.3	0.09
12	13 6	8 33 42.46	18 35 44.3	0.3	1.3	0.09	27	10 0	8 28 41.98	18 54 13.2	0.3	1.3	0.09
13	13 2	8 33 35.80	18 36 9.1	0.3	1.3	0.09	28	9 56	8 28 36.54	18 54 33.2	0.3	1.3	0.09
14	12 58	8 33 29.12	18 36 33.9	0.3	1.3	0.09	Mar. 1	9 52	8 28 31.19	18 54 52.9	0.3	1.3	0.09
15	12 54	8 33 22.39	+18 36 59.0	0.3	1.3	0.09	2	9 48	8 28 25.93	+18 55 12.3	0.3	1.3	0.09
16	12 50	8 33 15.63	18 37 24.1	0.3	1.3	0.09	3	9 44	8 28 20.75	18 55 31.4	0.3	1.3	0.09
17	12 46	8 33 8.86	18 37 49.3	0.3	1.3	0.09	4	9 40	8 28 15.67	18 55 50.2	0.3	1.3	0.09
18	12 42	8 33 2.05	18 38 14.5	0.3	1.3	0.09	5	9 36	8 28 10.67	18 56 8.6	0.3	1.3	0.09
19	12 38	8 32 55.22	18 38 39.9	0.3	1.3	0.09	6	9 32	8 28 5.77	18 56 26.7	0.3	1.3	0.09
20	12 34	8 32 48.38	+18 39 5.2	0.3	1.3	0.09	7	9 28	8 28 0.97	+18 56 44.5	0.3	1.3	0.09
21	12 30	8 32 41.52	18 39 30.6	0.3	1.3	0.09	8	9 24	8 27 56.26	18 57 1.9	0.3	1.3	0.09
22	12 26	8 32 34.66	18 39 56.1	0.3	1.3	0.09	9	9 20	8 27 51.66	18 57 18.9	0.3	1.3	0.09
23	12 22	8 32 27.78	18 40 21.6	0.3	1.3	0.09	10	9 16	8 27 47.16	18 57 35.5	0.3	1.3	0.09
24	12 18	8 32 20.89	18 40 47.1	0.3	1.3	0.09	11	9 12	8 27 42.76	18 57 51.9	0.3	1.3	0.09
25	12 13	8 32 14.00	+18 41 12.6	0.3	1.3	0.09	12	9 8	8 27 38.47	+18 58 7.8	0.3	1.3	0.09
26	12 9	8 32 7.11	18 41 38.0	0.3	1.3	0.09	13	9 4	8 27 34.30	18 58 23.2	0.3	1.3	0.09
27	12 5	8 32 0.22	18 42 3.5	0.3	1.3	0.09	14	9 0	8 27 30.23	18 58 38.4	0.3	1.3	0.09
28	12 1	8 31 53.33	18 42 28.9	0.3	1.3	0.09	15	8 56	8 27 26.27	18 58 53.1	0.3	1.3	0.09
29	11 57	8 31 46.45	18 42 54.4	0.3	1.3	0.09	16	8 52	8 27 22.43	18 59 7.4	0.3	1.3	0.09
30	11 53	8 31 39.58	+18 43 19.7	0.3	1.3	0.09	17	8 48	8 27 18.71	+18 59 21.4	0.3	1.3	0.09
31	11 49	8 31 32.72	18 43 45.0	0.3	1.3	0.09	18	8 44	8 27 15.10	18 59 35.0	0.3	1.3	0.09
Feb. 1	11 45	8 31 25.88	18 44 10.3	0.3	1.3	0.09	19	8 40	8 27 11.61	18 59 48.2	0.3	1.3	0.09
2	11 41	8 31 19.05	18 44 35.5	0.3	1.3	0.09	20	8 36	8 27 8.23	19 0 0.8	0.3	1.3	0.09
3	11 37	8 31 12.23	18 45 0.6	0.3	1.3	0.09	21	8 32	8 27 4.96	19 0 13.1	0.3	1.3	0.09
4	11 33	8 31 5.45	+18 45 25.7	0.3	1.3	0.09	22	8 28	8 27 1.83	+19 0 25.0	0.3	1.3	0.09
5	11 29	8 30 58.70	18 45 50.5	0.3	1.3	0.09	23	8 24	8 26 58.81	19 0 36.5	0.3	1.3	0.09
6	11 25	8 30 51.96	18 46 15.4	0.3	1.3	0.09	24	8 20	8 26 55.92	19 0 47.4	0.3	1.3	0.09
7	11 21	8 30 45.27	18 46 40.1	0.3	1.3	0.09	25	8 16	8 26 53.16	19 0 58.0	0.3	1.3	0.09
8	11 17	8 30 38.61	18 47 4.5	0.3	1.3	0.09	26	8 12	8 26 50.52	19 1 8.1	0.3	1.3	0.09
9	11 13	8 30 31.97	+18 47 28.9	0.3	1.3	0.09	27	8 8	8 26 48.00	+19 1 17.8	0.3	1.3	0.09
10	11 9	8 30 25.38	18 47 53.2	0.3	1.3	0.09	28	8 4	8 26 45.61	19 1 27.1	0.3	1.3	0.09
11	11 5	8 30 18.84	18 48 17.2	0.3	1.3	0.09	29	8 0	8 26 43.36	19 1 36.0	0.3	1.3	0.09
12	11 1	8 30 12.33	18 48 41.1	0.3	1.3	0.09	30	7 56	8 26 41.22	19 1 44.4	0.3	1.3	0.09
13	10 57	8 30 5.88	18 49 4.9	0.3	1.3	0.09	31	7 52	8 26 39.21	19 1 52.3	0.3	1.3	0.09
14	10 53	8 29 59.47	+18 49 28.4	0.3	1.3	0.09	Apr. 1	7 48	8 26 37.34	+19 1 59.8	0.3	1.3	0.09
15	10 49	8 29 53.12	+18 49 51.7	0.3	1.3	0.09	2	7 44	8 26 35.59	+19 2 6.8	0.3	1.3	0.09

Stellar magnitude at opposition in January, 1918, 7.7.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Apr. 1	7 48	8 26 37.34	+19 1 59.8	0.3	1.3	0.09	Nov. 15	17 8	8 46 56.08	+17 49 34.5	0.3	1.3	0.09
2	7 44	8 26 35.59	19 2 6.8	0.3	1.3	0.09	16	17 4	8 46 55.47	17 49 37.4	0.3	1.3	0.09
3	7 40	8 26 33.97	19 2 13.4	0.3	1.3	0.09	17	17 0	8 46 54.72	17 49 40.8	0.3	1.3	0.09
4	7 36	8 26 32.48	19 2 19.5	0.3	1.3	0.09	18	16 56	8 46 53.83	17 49 44.8	0.3	1.3	0.09
5	7 32	8 26 31.13	19 2 25.2	0.3	1.3	0.09	19	16 52	8 46 52.81	17 49 49.2	0.3	1.3	0.09
6	7 29	8 26 29.91	+19 2 30.4	0.3	1.3	0.09	20	16 48	8 46 51.66	+17 49 54.2	0.3	1.3	0.09
7	7 25	8 26 28.83	19 2 35.1	0.3	1.3	0.09	21	16 45	8 46 50.37	17 49 59.7	0.3	1.3	0.09
8	7 21	8 26 27.89	19 2 39.3	0.3	1.3	0.09	22	16 41	8 46 48.95	17 50 5.7	0.3	1.3	0.09
9	7 17	8 26 27.09	19 2 43.1	0.3	1.3	0.09	23	16 37	8 46 47.39	17 50 12.3	0.3	1.3	0.09
10	7 13	8 26 26.41	19 2 46.4	0.3	1.3	0.09	24	16 33	8 46 45.70	17 50 19.4	0.3	1.3	0.09
11	7 9	8 26 25.87	+19 2 49.2	0.3	1.3	0.09	25	16 29	8 46 43.88	+17 50 27.0	0.3	1.3	0.09
12	7 5	8 26 25.47	19 2 51.6	0.3	1.3	0.09	26	16 25	8 46 41.92	17 50 35.1	0.3	1.3	0.09
13	7 1	8 26 25.21	19 2 53.5	0.3	1.3	0.09	27	16 21	8 46 39.84	17 50 43.7	0.3	1.3	0.09
14	6 57	8 26 25.08	19 2 54.9	0.3	1.3	0.09	28	16 17	8 46 37.63	17 50 52.9	0.3	1.3	0.09
15	6 53	8 26 25.09	19 2 55.9	0.3	1.3	0.09	29	16 13	8 46 35.28	17 51 2.6	0.3	1.3	0.09
16	6 49	8 26 25.23	+19 2 56.3	0.3	1.3	0.09	30	16 9	8 46 32.80	+17 51 12.8	0.3	1.3	0.09
17	6 45	8 26 25.51	19 2 56.3	0.3	1.3	0.09	Dec. 1	16 5	8 46 30.20	17 51 23.5	0.3	1.3	0.09
18	6 41	8 26 25.93	19 2 55.9	0.3	1.3	0.09	2	16 1	8 46 27.47	17 51 34.7	0.3	1.3	0.09
19	6 37	8 26 26.48	19 2 54.9	0.3	1.3	0.09	3	15 57	8 46 24.61	17 51 46.3	0.3	1.3	0.09
20	6 33	8 26 27.18	19 2 53.5	0.3	1.3	0.09	4	15 53	8 46 21.62	17 51 58.5	0.3	1.3	0.09
21	6 30	8 26 28.00	+19 2 51.6	0.3	1.3	0.09	5	15 49	8 46 18.51	+17 52 11.2	0.3	1.3	0.09
22	6 26	8 26 28.97	19 2 49.3	0.3	1.3	0.09	6	15 45	8 46 15.28	17 52 24.3	0.3	1.3	0.09
	....	.....	.....	..	..	...	7	15 41	8 46 11.93	17 52 37.9	0.3	1.3	0.09
	....	.....	.....	..	..	...	8	15 37	8 46 8.47	17 52 51.9	0.3	1.3	0.09
Oct. 24	18 34	8 46 34.71	+17 50 48.5	0.3	1.3	0.09	9	15 33	8 46 4.88	17 53 6.4	0.3	1.3	0.09
25	18 30	8 46 37.12	+17 50 39.5	0.3	1.3	0.09	10	15 29	8 46 1.18	+17 53 21.4	0.3	1.3	0.09
26	18 27	8 46 39.39	17 50 31.0	0.3	1.3	0.09	11	15 25	8 45 57.37	17 53 36.8	0.3	1.3	0.09
27	18 23	8 46 41.53	17 50 23.1	0.3	1.3	0.09	12	15 21	8 45 53.44	17 53 52.6	0.3	1.3	0.09
28	18 19	8 46 43.54	17 50 15.7	0.3	1.3	0.09	13	15 17	8 45 49.40	17 54 8.9	0.3	1.3	0.09
29	18 15	8 46 45.40	17 50 8.8	0.3	1.3	0.09	14	15 13	8 45 45.25	17 54 25.6	0.3	1.3	0.09
30	18 11	8 46 47.13	+17 50 2.4	0.3	1.3	0.09	15	15 9	8 45 41.00	+17 54 42.7	0.3	1.3	0.09
31	18 7	8 46 48.73	17 49 56.6	0.3	1.3	0.09	16	15 5	8 45 36.64	17 55 0.2	0.3	1.3	0.09
Nov. 1	18 3	8 46 50.18	17 49 51.4	0.3	1.3	0.09	17	15 1	8 45 32.17	17 55 18.2	0.3	1.3	0.09
2	17 59	8 46 51.50	17 49 46.7	0.3	1.3	0.09	18	14 57	8 45 27.60	17 55 36.5	0.3	1.3	0.09
3	17 55	8 46 52.69	17 49 42.5	0.3	1.3	0.09	19	14 53	8 45 22.93	17 55 55.3	0.3	1.3	0.09
4	17 51	8 46 53.73	+17 49 38.8	0.3	1.3	0.09	20	14 49	8 45 18.16	+17 56 14.4	0.3	1.3	0.09
5	17 48	8 46 54.63	17 49 35.7	0.3	1.3	0.09	21	14 45	8 45 13.29	17 56 33.9	0.3	1.3	0.09
6	17 44	8 46 55.40	17 49 33.2	0.3	1.3	0.09	22	14 41	8 45 8.32	17 56 53.7	0.3	1.3	0.09
7	17 40	8 46 56.02	17 49 31.2	0.3	1.3	0.09	23	14 37	8 45 3.27	17 57 14.0	0.3	1.3	0.09
8	17 36	8 46 56.51	17 49 29.7	0.3	1.3	0.09	24	14 33	8 44 58.12	17 57 34.6	0.3	1.3	0.09
9	17 32	8 46 56.86	+17 49 28.7	0.3	1.3	0.09	25	14 29	8 44 52.87	+17 57 55.5	0.3	1.3	0.09
10	17 28	8 46 57.08	17 49 28.3	0.3	1.3	0.09	26	14 25	8 44 47.54	17 58 16.6	0.3	1.3	0.09
11	17 24	8 46 57.15	17 49 28.5	0.3	1.3	0.09	27	14 21	8 44 42.12	17 58 38.2	0.3	1.3	0.09
12	17 20	8 46 57.09	17 49 29.1	0.3	1.3	0.09	28	14 17	8 44 36.62	17 59 0.1	0.3	1.3	0.09
13	17 16	8 46 56.89	17 49 30.4	0.3	1.3	0.09	29	14 13	8 44 31.04	17 59 22.2	0.3	1.3	0.09
14	17 12	8 46 56.55	+17 49 32.2	0.3	1.3	0.09	30	14 9	8 44 25.38	+17 59 44.7	0.3	1.3	0.09
15	17 8	8 46 56.08	+17 49 34.5	0.3	1.3	0.09	31	14 5	8 44 19.64	+18 0 7.5	0.3	1.3	0.09

Stellar magnitude at opposition in January, 1918, 7.7.

PART III.

PHENOMENA.

In the year 1918 there will be three eclipses, two of the Sun and one of the Moon.

I.—*A Total Eclipse of the Sun*, 1918, June 8, visible at Washington as a partial eclipse.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of \odot in right ascension, June				d	h	m	s
				8	10	7	24.2
Sun and Moon's R. A.	h	m	s	Hourly motions			
	5	4	39.98	10.33 and 152.10			
Sun's declination	+	22	50 23.8	Hourly motion			
Moon's declination	+	23	17 39.1	Hourly motion			
Sun's equa. hor. parallax			8.7	Sun's true semidiameter			
Moon's equa. hor. parallax		58	39.4	Moon's true semidiameter			

CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Mean Time.			Longitude from Greenwich.		Latitude.	
	d	h	m	.	'	.	'
Eclipse begins	June	8	7 29.0	−150	20	+16	22
Central eclipse begins		8	8 32.2	−129	58	+25	41
Central eclipse at local apparent noon		8	10 7.4	+152	10	+50	51
Central eclipse ends		8	11 42.9	+ 74	31	+25	23
Eclipse ends		8	12 46.2	+ 94	53	+16	3

II.—*A Partial Eclipse of the Moon*, 1918, June 23–24, partly visible at Washington, the Moon setting eclipsed; the beginning visible generally in South America except the eastern portion, North America except the northern portion, throughout the Pacific Ocean and Australia; the ending visible generally in southwestern North America, western and southern South America, throughout the Pacific Ocean and Australia.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of \odot in right ascension, June				d	h	m	s
				23	22	39	44.2
Sun's right ascension	h	m	s	Hourly motion			
	6	9	7.39	10.39			
Moon's right ascension	h	m	s	Hourly motion			
	18	9	7.39	143.63			
Sun's declination	+	23	25 58.1	Hourly motion			
Moon's declination	−	22	31 46.4	Hourly motion			
Sun's equa. hor. parallax			8.7	Sun's true semidiameter			
Moon's equa. hor. parallax		57	18.4	Moon's true semidiameter			

CIRCUMSTANCES OF THE ECLIPSE.

	June	d	h	m	Greenwich Mean Time.
		23	20	8.7	
		23	21	46.4	
		23	22	28.0	
		23	23	9.8	
Moon enters penumbra		24	0	47.1	

Contacts of Umbra with Moon's Limb.	Angles of Position from the North Point.	The Moon being in the Zenith in Longitude from Greenwich, and in latitude.			
		.	'	.	'
First	152 to E.	+146	36	−22	35
Last	165 to W.	+166	40	−22	30

Magnitude of the eclipse=0.135 (Moon's diameter=1.0).

III.—*An Annular Eclipse of the Sun*, 1918, December 3, invisible at Washington.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of ϕ in right ascension, December 3				d	h	m	s
				3	3	22	59.9
Sun and Moon's R. A.	h	m	s	Hourly motions			
	16	36	17.31	10.84 and 133.04			
	.	'	"	'			
Sun's declination	-22	3	17.5	Hourly motion			
				-0 21.6			
Moon's declination	-22	16	25.0	Hourly motion			
				-1 33.1			
Sun's equa. hor. parallax			8.9	Sun's true semidiameter			
				16 13.6			
Moon's equa. hor. parallax	55	3.2		Moon's true semidiameter			
				14 59.3			

CIRCUMSTANCES OF THE ECLIPSE.

		Greenwich Mean Time.			Longitude from Greenwich.		Latitude.
		d	h	m	.	'	
Eclipse begins	December	3	0	21.3	+100	17	- 5 52
Central eclipse begins		3	1	28.8	+119	7	-10 36
Central eclipse at local apparent noon		3	3	23.0	+ 53	19	-36 5
Central eclipse ends		3	5	14.9	- 14	59	-15 4
Eclipse ends		3	6	22.3	+ 3	53	-10 21

The regions within which the eclipses of the Sun are visible are laid down the accompanying charts, from which, by means of the dotted lines, the Greenwich mean times of beginning and ending at any place may be found with an uncertainty which will vary from three or four minutes for a high sun to fifteen or twenty minutes when the Sun is near the horizon.

BESSELIAN ELEMENTS OF THE TOTAL ECLIPSE OF THE SUN, 1918,
JUNE 8.

HARVARD

TOTAL ECLIPSE

Note - The hours of beginning and end.

F JUNE 8TH 1918.

2

Mean Time.

PATH OF TOTAL PHASE DURING THE ECLIPSE OF THE SUN,
1918, JUNE 8.

Green- wich Mean Time.	Northern Limit.		Central Line.		Southern Limit.		Duration of Total Phase on Central Line.
	Latitude.	Longitude from Greenwich.	Latitude.	Longitude from Greenwich.	Latitude.	Longitude from Greenwich.	
	° ' ''	° ' ''	° ' ''	° ' ''	° ' ''	° ' ''	m s
Limits.	+25 55	-129 47	+25 41	-129 58	+25 27	-130 9	. . .
3 ^h 35 ^m	31 2.6	140 55.8	31 6.8	141 54.8	31 9.4	142 51.6	1 2.9
40	34 50.5	148 47.9	34 44.9	149 32.5	34 38.6	150 16.5	1 15.3
45	37 26.8	154 12.9	37 16.8	154 53.2	37 6.3	155 33.0	1 24.6
50	39 31.8	158 40.9	39 18.8	159 18.7	39 5.3	159 56.0	1 32.4
55	41 17.5	162 37.8	41 2.0	163 13.8	40 46.1	163 49.1	1 39.3
10 0	+42 49.2	-166 15.7	+42 31.6	-166 49.8	+42 13.7	-167 23.4	1 45.4
5	44 10.0	169 40.6	43 50.5	170 13.2	43 30.7	170 45.1	1 51.1
10	45 21.6	172 57.1	45 0.4	173 28.0	44 39.0	173 58.2	1 56.2
15	46 25.1	176 7.8	46 2.4	176 36.8	45 39.5	-177 5.1	2 0.8
20	47 21.4	-179 14.5	46 57.4	-179 41.4	46 33.1	+179 52.3	2 4.9
25	48 11.1	+177 41.5	47 45.9	+177 16.8	47 20.4	176 52.7	2 8.7
30	+48 54.6	+174 39.2	+48 28.3	+174 17.0	+48 1.7	+173 55.2	2 12.0
35	49 32.1	171 38.0	49 4.8	171 18.3	48 37.4	170 59.1	2 14.8
40	50 4.0	168 37.4	49 35.8	168 20.5	49 7.5	168 3.9	2 17.3
45	50 30.2	165 37.0	50 1.4	165 23.0	49 32.4	165 9.3	2 19.3
50	50 50.9	162 36.8	50 21.5	162 25.8	49 52.1	162 15.0	2 20.9
55	51 6.3	159 36.5	50 36.5	159 28.7	50 6.6	159 21.0	2 22.0
10 0	+51 16.2	+156 36.2	+50 46.2	+156 31.6	+50 16.1	+156 27.1	2 22.7
5	51 20.9	153 36.0	50 50.8	153 34.6	50 20.6	153 33.2	2 23.0
10	51 20.3	150 35.8	50 50.2	150 37.6	50 20.0	150 39.4	2 22.8
15	51 14.3	147 35.7	50 44.4	147 40.8	50 14.5	147 45.7	2 22.2
20	51 3.1	144 35.8	50 33.5	144 44.1	50 4.0	144 52.1	2 21.2
25	50 46.6	141 36.2	50 17.5	141 47.5	49 48.3	141 58.5	2 19.7
30	+50 24.6	+138 36.7	+49 56.1	+138 51.0	+49 27.6	+139 4.8	2 17.8
35	49 57.2	135 37.4	49 29.5	135 54.4	49 1.7	136 11.0	2 15.4
40	49 24.2	132 37.9	48 57.4	132 57.5	48 30.5	133 16.7	2 12.7
45	48 45.6	129 37.9	48 19.8	130 0.0	47 53.9	130 21.6	2 9.5
50	48 1.0	126 37.1	47 36.4	127 1.4	47 11.6	127 25.1	2 5.9
55	47 10.3	123 34.6	46 47.0	124 1.0	46 23.4	124 26.7	2 1.9
11 0	+46 13.1	+120 29.6	+45 51.2	+120 57.8	+45 28.9	+121 25.4	1 57.5
5	45 8.7	117 20.7	44 48.3	117 50.6	44 27.6	118 19.9	1 52.7
10	43 56.4	114 6.0	43 37.8	114 37.5	43 18.6	115 8.3	1 47.4
15	42 35.1	110 42.9	42 18.2	111 15.8	42 1.0	111 48.1	1 41.6
20	41 2.9	107 7.4	40 48.1	107 41.7	40 32.8	108 15.5	1 35.2
25	39 16.8	103 12.9	39 4.4	103 48.8	38 51.6	104 24.3	1 28.2
30	+37 11.7	+ 98 47.8	+37 2.2	+ 99 25.9	+36 52.4	+100 3.4	1 20.3
35	34 35.9	93 26.7	34 30.6	94 8.5	34 24.7	94 49.6	1 11.0
40	30 51.0	85 43.9	30 54.5	86 37.8	30 56.7	87 30.0	0 58.7
Limits.	+25 35	+ 74 20	+25 23	+ 74 31	+25 11	+ 74 41	. . .

ANNULAR ECLIPSE

Note - The hours of beginning and er

DECEMBER 3RD 1918.

xpressed in Greenwich Mean Time .

ATH OF ANNULAR PHASE DURING THE ECLIPSE OF THE SUN,
1918, DECEMBER 3.

Green- wich Mean Time.	Northern Limit.		Central Line.		Southern Limit.		Duration of Annular Phase on Central Line.
	Latitude.	Longitude from Greenwich.	Latitude.	Longitude from Greenwich.	Latitude.	Longitude from Greenwich.	
imits.	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	m s
1 ^h 30 ^m	— 9 23	+118 20	—10 36	+119 7	—11 50	+119 55	. . .
35	13 48.0	108 18.1	13 46.9	111 40.9	12 48.4	117 43.7	5 8.7
40	17 16.3	101 5.4	17 49.2	103 1.7	18 18.4	105 10.7	5 23.6
45	19 37.1	96 24.7	20 18.3	97 58.6	20 58.0	99 39.2	5 34.0
50	21 29.6	92 43.2	22 15.1	94 5.1	22 59.8	95 31.5	5 42.9
55	23 5.1	89 35.0	23 53.4	90 48.6	24 41.1	92 5.9	5 50.9
2 0	24 28.6	86 48.2	25 18.9	87 55.6	26 8.9	89 6.1	5 58.4
5	—25 42.9	+ 84 16.6	—26 34.8	+ 85 18.9	—27 26.7	+ 86 23.9	6 5.4
10	26 49.8	81 56.2	27 43.1	82 54.1	28 36.5	83 54.4	6 12.0
15	27 50.4	79 44.2	28 44.9	80 38.1	29 39.5	81 34.1	6 18.3
20	28 45.6	77 38.7	29 41.1	78 28.9	30 36.9	79 21.1	6 24.2
25	29 35.9	75 38.4	30 32.4	76 25.1	31 29.2	77 13.6	6 29.8
30	30 21.8	73 42.1	31 19.2	74 25.4	32 17.0	75 10.5	6 35.1
35	—31 3.7	+ 71 49.1	—32 1.9	+ 72 29.2	—33 0.6	+ 73 10.8	6 40.0
40	31 41.8	69 58.6	32 40.8	70 35.5	33 40.2	71 13.8	6 44.5
45	32 16.3	68 10.3	33 16.0	68 44.0	34 16.2	69 18.9	6 48.7
50	32 47.4	66 23.6	33 47.8	66 54.1	34 48.6	67 25.7	6 52.4
55	33 15.2	64 38.1	34 16.2	65 5.4	35 17.7	65 33.7	6 55.8
3 0	33 39.8	62 53.5	34 41.4	63 17.6	35 48.4	63 42.6	6 58.7
5	—34 1.3	+ 61 9.6	—35 3.4	+ 61 30.5	—36 5.9	+ 61 52.1	7 1.1
10	34 19.8	59 26.1	35 22.3	59 43.7	36 25.3	60 1.9	7 3.1
15	34 35.3	57 42.8	35 38.2	57 57.1	36 41.5	58 11.8	7 4.6
20	34 47.8	55 59.5	35 51.0	56 10.4	36 54.6	56 21.6	7 5.5
25	34 57.3	54 16.0	36 0.7	54 23.5	37 4.6	54 31.1	7 6.0
30	35 3.9	52 32.1	36 7.5	52 36.2	37 11.5	52 40.2	7 5.9
35	—35 7.5	+ 50 47.7	—36 11.1	+ 50 48.3	—37 15.3	+ 50 48.7	7 5.4
40	35 8.1	49 2.7	36 11.8	48 59.7	37 15.9	48 56.5	7 4.3
45	35 5.6	47 16.7	36 9.2	47 10.2	37 13.3	47 3.3	7 2.7
50	35 0.0	45 29.7	36 3.5	45 19.6	37 7.5	45 9.0	7 0.6
55	34 51.3	43 41.4	35 54.6	43 27.7	36 58.3	43 13.4	6 58.0
4 0	34 39.3	41 51.6	35 42.3	41 34.3	36 45.8	41 16.2	6 54.9
5	—34 23.9	+ 40 0.0	—35 26.6	+ 39 39.2	—36 29.7	+ 39 17.2	6 51.3
10	34 5.1	38 6.4	35 7.4	37 41.9	36 10.0	37 16.1	6 47.4
15	33 42.6	36 10.4	34 44.4	35 42.2	35 46.5	35 12.5	6 42.9
20	33 16.2	34 11.5	34 17.5	33 39.5	35 18.9	33 5.9	6 38.1
25	32 45.8	32 9.3	33 46.4	31 33.4	34 47.1	30 55.7	6 32.9
30	32 11.0	30 3.0	33 10.8	29 23.1	34 10.7	28 41.2	6 27.3
35	—31 31.4	+ 27 51.8	—32 30.2	+ 27 7.7	—33 29.2	+ 26 21.5	6 21.3
40	30 46.5	25 34.6	31 44.3	24 46.1	32 42.1	23 55.2	6 15.0
45	29 55.6	23 9.9	30 52.1	22 16.6	31 48.7	21 20.8	6 8.3
50	28 57.7	20 35.7	29 52.9	19 37.2	30 47.9	18 35.7	6 1.3
55	27 51.8	17 48.9	28 45.1	16 44.5	29 38.1	15 36.5	5 53.8
5 0	26 35.5	14 45.1	27 26.5	13 33.4	28 17.0	12 17.3	5 45.9
5	—25 5.7	+ 11 16.8	—25 53.5	+ 9 55.4	—26 40.2	+ 8 28.5	5 37.2
10	23 16.1	7 9.6	23 58.7	+ 5 33.6	24 39.3	+ 3 39.4	5 27.7
imits.	20 51.7	+ 1 48.9	21 23.1	— 0 16.6	21 49.0	— 2 39.7	5 16.3
	—13 52	— 14 12	—15 4	— 14 59	—16 16	— 15 47	. . .

LOCAL CIRCUMSTANCES OF THE ECLIPSE OF THE SUN, 1918, JUNE 8.

41-42

LOCAL CIRCUMSTANCES OF THE ECLIPSE OF THE SUN, 1918, JUNE 8.

Place.	Beginning.			Middle.		Ending.		
	Greenwich Mean Time.	Angle from North Point.	Angle from Vertex.	Greenwich Mean Time.	Magni- tude.	Greenwich Mean Time.	Angle from North Point.	Angle from Vertex.
	h m	°	°	h m		h m	°	°
Haven, Conn. . . .	10 31	258	206	11 25	0.66	12 15	117	73
Orleans, La. . . .	10 38	283	216	11 41	0.95	12 38	96	37
York, N. Y. . . .	10 32	259	206	11 26	0.68	12 16	116	71
, Alaska	8 49	246	265	9 55	0.63	11 2	111	111
oma City, Okla. . .	10 26	280	218	11 33	0.99	12 33	98	42
a, Nebr.	10 19	271	216	11 25	0.88	12 25	106	55
, Me.	10 29	251	203	11 19	0.56	12 7	123	82
d, Miss.	10 33	277	214	11 36	0.96	12 33	101	46
na, Panama	11 8	308	226	.. ..	...	.. ..	...	...
delphia, Pa. . . .	10 32	261	207	11 27	0.71	12 18	115	68
ix, Ariz.	10 13	292	228	11 28	0.79	12 33	87	25
, S. Dak.	10 11	269	219	11 18	0.86	12 20	107	58
nd, Oreg.	9 38	277	243	10 58	0.99	12 11	96	46
akeepsie, N. Y. . .	10 31	258	206	11 25	0.66	12 15	117	70
gh, N. C.	10 36	268	209	11 33	0.82	12 26	109	58
nond, Va.	10 34	265	208	11 31	0.77	12 23	111	62
mento, Cal.	9 50	288	239	11 10	0.82	12 22	88	30
ake City, Utah . .	10 1	280	228	11 17	0.97	12 24	96	42
uan, P. R.	10 52	284	213	.. ..	...	.. ..	...	...
Fe, N. Mex. . . .	10 17	285	223	11 29	0.91	12 33	94	35
le, Wash.	9 37	273	243	10 56	0.98	12 8	99	52
gfield, Ill.	10 26	269	213	11 28	0.85	12 25	108	57
ouis, Mo.	10 27	271	214	11 30	0.88	12 27	106	54
use, N. Y.	10 28	258	206	11 23	0.66	12 14	118	73
assee, Fla.	10 40	279	213	11 40	0.99	12 35	99	43
ra, Kans.	10 22	274	216	11 28	0.93	12 28	103	50
loosa, Ala.	10 35	277	214	11 37	0.97	12 34	101	46
, Cal.	9 46	288	242	11 7	0.82	12 20	87	30
ia, Ill.	10 26	268	212	11 28	0.83	12 25	108	58
ington, D. C. . . .	10 33	263	208	11 29	0.74	12 21	113	65
ams Bay, Wis. . . .	10 23	265	212	11 24	0.78	12 21	111	63

566 STARS OCCULTED BY THE MOON, 1918.

MEAN PLACES FOR 1918.0. (January 0^d.673, Greenwich.)

Name of Star.		Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.			Annual Proper Motion
			h	m	s	s	°	'	"	"
36	Piscium . . .	6.2	0	12	21.141	-0.0027	+ 7	47	6.29	-0.006
d	Piscium . . .	5.4	0	16	22.647	+0.0003	7	44	5.88	+0.016
136 B.	Piscium . . .	6.5	0	36	57.549	-0.0084	8	54	27.93	-0.082
75	Piscium . . .	6.3	1	2	14.659	+0.0012	12	31	0.99	+0.042
η	Piscium . . .	3.7	1	27	5.542	+0.0015	14	55	24.68	-0.003
101	Piscium . . .	6.2	1	31	23.230	+0.0010	+14	14	33.62	-0.002
105	Piscium . . .	6.1	1	35	15.177	+0.0053	15	59	25.03	-0.006
4	Arietis . . .	5.8	1	43	43.866	+0.0035	16	32	52.24	-0.021
ι	Arietis . . .	5.1	1	52	52.051	+0.0021	17	25	3.64	-0.020
35 B.	Arietis . . .	6.4	1	59	12.551	-0.0008	17	51	34.92	-0.018
47 B.	Arietis . . .	6.5	2	3	15.568	-0.0037	+17	38	21.41	-0.007
20 H ¹ .	Arietis . . .	6.4	2	4	52.640	+0.0112	16	50	24.96	-0.179
26	Arietis . . .	6.2	2	26	2.267	+0.0050	19	29	31.46	-0.022
27	Arietis . . .	6.4	2	26	21.324	+0.0029	17	20	30.41	-0.089
μ	Arietis . . .	5.7	2	37	44.355	+0.0023	19	39	46.32	-0.038
36	Arietis . . .	6.5	2	39	44.391	+0.0036	+17	25	2.73	-0.040
40	Arietis . . .	6.0	2	43	56.044	+0.0030	17	56	34.79	-0.020
45	Arietis . . .	6.0	2	51	11.799	-0.0011	18	0	0.81	-0.006
ρ	Arietis . . .	5.6	2	51	48.226	+0.0196	17	41	48.90	-0.208
47	Arietis . . .	5.8	2	53	23.389	+0.0160	20	20	26.73	-0.021
ε	Arietis (mean)	4.6	2	54	31.161	-0.0009	+21	0	47.17	-0.010
54	Arietis . . .	6.5	3	3	41.984	+0.0018	18	28	52.08	-0.014
δ	Arietis . . .	4.5	3	6	56.215	+0.0110	19	25	2.93	+0.001
ζ	Arietis . . .	5.0	3	10	11.074	-0.0019	20	44	28.71	-0.082
τ	Arietis . . .	5.2	3	16	29.388	+0.0023	20	51	8.08	-0.033
63	Arietis . . .	5.2	3	18	1.880	-0.0032	+20	26	58.95	-0.009
65	Arietis . . .	6.0	3	19	42.238	+0.0006	20	30	48.11	-0.006
66	Arietis . . .	6.1	3	23	38.780	+0.0006	22	31	19.93	-0.112
14 H ¹ .	Tauri . . .	6.5	3	34	14.360	. . . .	20	38	58.15	. . .
22 H ¹ .	Tauri . . .	6.1	3	39	41.685	+0.0008	20	40	14.45	-0.006
23	Tauri . . .	4.3	3	41	27.353	+0.0016	+23	41	37.52	-0.060
104 B.	Tauri . . .	5.5	3	43	29.329	+0.0008	23	10	12.80	-0.045
27	Tauri . . .	3.7	3	44	16.977	+0.0013	23	48	13.03	-0.048
28	Tauri . . .	5.2	3	44	18.268	+0.0009	23	53	13.67	-0.046
133 B.	Tauri . . .	5.9	3	45	5.721	+0.0026	21	59	44.12	-0.042
32	Tauri . . .	5.8	3	52	1.138	+0.0045	+22	14	33.85	-0.112
33	Tauri . . .	6.0	3	52	12.033	+0.0026	22	56	18.57	-0.009
161 B.	Tauri . . .	6.5	3	56	4.659	+0.0027	22	58	14.47	-0.062
36	Tauri . . .	5.6	3	59	27.228	+0.0001	23	52	51.85	-0.022
A	Tauri . . .	4.5	3	59	50.682	+0.0070	21	51	31.94	-0.068
39	Tauri . . .	6.1	4	0	28.816	+0.0124	+21	47	18.93	-0.131
192 B.	Tauri . . .	6.1	4	7	59.261	-0.0016	22	12	12.84	-0.019
51	Tauri . . .	5.6	4	13	31.882	+0.0071	21	22	47.34	-0.041
53	Tauri . . .	5.3	4	14	35.995	+0.0028	20	56	41.69	-0.051
56	Tauri . . .	5.2	4	14	45.309	+0.0032	21	34	35.06	-0.040
227 B.	Tauri . . .	5.9	4	18	42.322	+0.0019	+20	47	30.83	-0.031
62	Tauri . . .	6.1	4	19	2.978	+0.0008	24	6	39.32	-0.019
κ	Tauri . . .	4.1	4	20	28.731	+0.0062	22	6	26.28	-0.042
67	Tauri . . .	5.4	4	20	31.860	+0.0093	22	0	48.53	-0.048
ν	Tauri . . .	4.2	4	21	23.899	+0.0079	22	37	43.03	-0.048
72	Tauri . . .	5.4	4	22	23.082	+0.0004	+22	48	45.41	-0.008
247 B.	Tauri . . .	5.8	4	23	8.609	+0.0073	21	26	15.61	-0.076
284 B.	Tauri . . .	6.0	4	31	32.797	+0.0106	23	10	26.79	-0.102
τ	Tauri . . .	4.3	4	37	19.291	+0.0007	+22	48	2.40	-0.020

STARS OCCULTED BY THE MOON, 1918. 567

MEAN PLACES FOR 1918.0. (January 0^d.673,

MEAN PLACES FOR 1918.0. (January 0^d.673, Greenwich.)

Name of Star.		Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.			Annual Proper Motion.
			h	m	s	s	°	'	''	"
A ¹	Cancrī . . .	5.5	8	38	41.356	-0.0002	+12	58	32.81	-0.002
A ²	Cancrī . . .	5.7	8	42	26.428	-0.0049	12	24	41.84	-0.007
54	Cancrī . . .	6.3	8	46	27.594	-0.0075	15	39	20.24	+0.005
60	Cancrī . . .	5.7	8	51	27.045	-0.0009	11	56	24.02	-0.003
α	Cancrī . . .	4.3	8	54	0.277	+0.0024	12	10	33.09	-0.002
κ	Cancrī . . .	5.1	9	3	18.477	-0.0012	+10	59	56.09	-0.003
209 B.	Cancrī . . .	6.5	9	5	19.218	-0.0008	11	53	56.53	-0.009
222 B.	Cancrī . . .	6.3	9	13	24.974	+0.0046	11	50	42.74	-0.007
ω	Leonis . . .	5.5	9	24	4.096	+0.0038	9	24	52.11	-0.002
ξ	Leonis . . .	5.1	9	27	31.684	-0.0063	11	39	49.04	-0.004
h	Leonis . . .	5.2	9	27	34.006	+0.0001	+10	4	41.00	-0.003
o	Leonis . . .	3.8	9	36	46.575	-0.0096	10	15	57.96	-0.003
83 B.	Leonis . . .	5.9	9	52	5.198	-0.0074	9	19	20.44	+0.017
89 B.	Leonis . . .	6.2	9	53	47.107	+0.0010	8	42	21.35	-0.009
π	Leonis . . .	4.9	9	55	52.892	-0.0029	8	26	17.49	-0.007
14	Sextantis . . .	6.3	10	2	30.238	-0.0022	+ 6	0	43.52	-0.002
19	Sextantis . . .	5.9	10	8	32.395	-0.0037	5	1	13.54	-0.006
155 B.	Leonis . . .	6.5	10	18	59.126	-0.0167	6	6	38.23	-0.071
237 B.	Leonis . . .	6.3	10	48	0.978	+0.0002	1	27	35.90	-0.055
55	Leonis . . .	6.1	10	51	29.343	+0.0073	1	10	27.52	-0.013
p ³	Leonis . . .	6.1	10	59	24.789	-0.0045	+ 0	26	27.72	+0.006
p ⁵	Leonis . . .	5.3	11	9	33.737	-0.0029	+ 0	22	36.62	-0.006
388 B.	Leonis . . .	6.3	11	23	42.319	-0.0025	- 1	14	54.22	+0.007
e	Leonis . . .	5.1	11	26	7.522	+0.0018	2	33	2.69	-0.006
431 B.	Leonis . . .	6.2	11	34	12.646	-0.0028	1	58	56.90	+0.047
13 B.	Virginis . . .	5.9	11	46	50.725	+0.0008	- 4	52	37.76	+0.006
64 B.	Virginis . . .	6.5	12	6	14.749	-0.0004	7	19	5.32	+0.017
78 B.	Virginis . . .	6.5	12	10	3.393	-0.0061	5	15	47.54	+0.114
q	Virginis . . .	5.3	12	29	32.728	-0.0067	8	59	59.06	+0.004
χ	Virginis . . .	4.8	12	35	0.730	-0.0056	7	32	40.18	-0.031
370 B.	Virginis . . .	6.0	12	50	2.558	-0.0058	-11	12	15.27	-0.037
φ	Virginis . . .	5.0	12	50	5.186	-0.0024	9	5	38.03	-0.026
49	Virginis . . .	5.2	13	3	35.918	+0.0007	10	18	8.17	-0.014
i	Virginis . . .	5.7	13	22	23.073	-0.0096	12	16	52.45	-0.023
75	Virginis . . .	5.6	13	28	28.613	-0.0050	14	56	29.30	+0.004
550 B.	Virginis . . .	6.0	13	30	18.721	-0.0040	-12	47	38.99	-0.014
83	Virginis . . .	5.6	13	40	4.172	+0.0007	15	46	1.61	-0.011
85	Virginis . . .	6.1	13	41	9.997	-0.0029	15	21	21.35	-0.034
214 G.	Virginis . . .	6.5	14	0	45.579	-0.0086	15	56	37.65	-0.012
40 H.	Virginis . . .	5.1	14	6	21.602	+0.0003	15	54	54.68	-0.014
43 H.	Virginis . . .	5.5	14	10	52.768	-0.0031	-17	49	7.08	-0.015
231 G.	Virginis . . .	6.4	14	12	31.571	-0.0005	18	12	16.80	+0.106
236 G.	Virginis . . .	5.7	14	14	6.017	-0.0039	18	20	11.20	-0.001
9 G.	Libræ . . .	6.5	14	30	13.737	+0.0032	20	4	48.21	-0.004
17 G.	Libræ . . .	6.4	14	41	31.606	-0.0047	20	49	44.20	-0.121
18 G.	Libræ . . .	6.1	14	42	33.687	-0.0032	-20	58	53.52	-0.014
43 B.	Libræ . . .	5.7	14	52	40.444	+0.0746	21	2	48.93	-1.792
47 G.	Libræ . . .	6.1	15	1	43.115	+0.0066	21	42	48.52	-0.050
ι	Libræ . . .	4.7	15	7	32.607	-0.0031	19	28	56.34	-0.063
25	Libræ . . .	6.0	15	8	38.726	-0.0036	19	20	21.85	-0.035
64 G.	Libræ . . .	5.8	15	11	37.581	-0.0028	-22	5	47.91	+0.018
147 B.	Libræ . . .	6.2	15	25	51.757	+0.0020	20	26	49.59	-0.029
150 B.	Libræ . . .	6.1	15	27	0.086	-0.0066	19	53	6.30	-0.081
11 H.	Libræ . . .	5.4	15	27	53.932	-0.0012	-19	23	30.75	-0.086

MEAN PLACES FOR 1918.0. (January 0^d.673, Greenwich.)

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**ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.
JANUARY.**

**ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.
JANUARY.**

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

FEBRUARY.

ELEMENTS FOR THE PREDICTION OF OCULTATIONS.

MARCH.






ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1918.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		$\Delta\alpha$	$\Delta\delta$								
		<i>s</i>	<i>"</i>	<i>°</i> <i>'</i>	<i>d</i> <i>h</i> <i>m</i>	<i>h</i> <i>m</i>				<i>°</i>	<i>°</i>
<i>A</i> Tauri	4.5	+1.37	+ 4.4	+21 51.6	17 3 16.7	- 1 5.7	+0.8649	0.5851	+0.0710	+90	+27
39 Tauri	6.1	1.38	4.4	21 47.4	3 32.1	- 0 50.8	+0.9553	0.5851	0.0703	+90	+33
192 B. Tauri	6.1	1.42	4.3	22 12.3	6 34.3	+ 2 4.4	+0.7331	0.5846	0.0627	+90	+20
62 Tauri	6.1	1.50	4.6	24 6.7	11 3.3	+ 6 23.0	-0.9741	0.5838	0.0515	-20	-66
κ Tauri	4.1	1.49	3.9	22 6.5	11 38.1	+ 6 56.5	+1.1210	0.5837	0.0500	+90	+47
67 Tauri	5.4	+1.49	+ 3.9	+22 0.9	11 39.3	+ 6 57.6	+1.2188	0.5837	+0.0500	+87	+58
ν Tauri	4.2	1.50	4.0	22 37.8	12 0.5	+ 7 18.1	+0.6021	0.5836	0.0491	+84	+13
72 Tauri	5.4	1.51	4.1	22 48.8	12 24.5	+ 7 41.1	+0.4319	0.5835	0.0481	+68	+ 4
284 B. Tauri	6.0	1.57	3.8	23 10.5	16 8.1	+11 16.2	+0.2212	0.5826	0.0387	+53	- 6
τ Tauri	4.3	1.60	3.5	22 48.1	18 29.4	-10 27.9	+0.6928	0.5820	0.0328	+90	+20
95 Tauri	6.2	+1.62	+ 3.9	+23 56.1	18 52.4	-10 5.8	-0.4695	0.5819	+0.0319	+13	-45
800 B. Tauri	6.2	1.63	3.6	23 28.8	19 53.5	- 9 7.0	+0.0340	0.5816	0.0293	+42	-15
315 B. Tauri	6.3	1.70	3.6	24 27.8	18 0 11.8	- 4 58.6	-0.8852	0.5803	0.0186	-13	-66
99 Tauri	6.0	1.70	3.3	23 49.3	0 50.5	- 4 21.4	-0.2076	0.5801	0.0170	+28	-28
103 Tauri	5.5	1.76	3.0	24 9.5	5 4.4	- 0 16.9	-0.5091	0.5786	+0.0065	+10	-46
121 Tauri	5.1	+1.92	+ 1.7	+23 59.2	16 26.8	+10 39.9	-0.4155	0.5738	-0.0210	+16	-41
175 H ¹ . Tauri	6.5	1.94	1.0	22 37.3	19 15.0	-10 38.0	+0.9533	0.5725	0.0276	+90	+37
394 B. Tauri	6.0	1.96	1.1	23 10.0	19 46.3	-10 8.0	+0.3642	0.5723	0.0289	+63	+ 2
132 Tauri	5.0	2.01	1.3	24 32.5	22 9.4	- 7 50.2	-1.1609	0.5711	0.0344	-38	-65
412 B. Tauri	5.8	2.05	+ 0.8	24 14.3	19 1 31.6	- 4 35.2	-0.9728	0.5694	0.0422	-20	-66
141 Tauri	6.3	+2.05	- 0.1	+22 24.0	3 35.2	- 2 36.1	+0.8804	0.5682	-0.0468	+90	+30
1 Geminorum	4.3	2.08	+ 0.1	23 16.1	4 36.8	- 1 36.7	-0.0884	0.5676	0.0492	+34	-24
14 B. Geminorum	6.0	2.09	- 0.5	22 12.2	6 57.6	+ 0 39.0	+0.9192	0.5664	0.0544	+90	+32
3 Geminorum	5.6	2.11	0.2	23 7.7	7 1.6	+ 0 42.8	-0.0644	0.5664	0.0545	+36	-23
6 Geminorum	6.3	2.12	0.4	22 55.7	8 8.7	+ 1 47.5	+0.0854	0.5658	0.0570	+45	-15
η Gemin. (<i>var.</i>)	3.2	+2.12	- 0.7	+22 31.9	9 15.6	+ 2 52.0	+0.4416	0.5652	-0.0594	+69	+ 3
8 Geminorum	6.1	2.16	0.2	23 59.8	9 51.5	+ 3 26.7	-1.1514	0.5648	0.0607	-36	-66
9 Geminorum	6.2	2.16	0.3	23 46.2	10 8.8	+ 3 43.4	-0.9273	0.5646	0.0614	-16	-66
μ Geminorum	3.2	2.17	1.1	22 33.4	12 45.9	+ 6 14.9	+0.1939	0.5632	0.0670	+51	-11
36 B. Geminorum	6.0	2.20	0.9	23 22.4	13 53.0	+ 7 19.6	-0.7523	0.5625	0.0694	- 4	-67
<i>d</i> Geminorum	5.2	+2.31	- 2.9	+21 51.5	20 1 24.7	- 5 33.0	-0.0740	0.5556	-0.0930	+35	-27
ζ Gemin. (<i>var.</i>)	3.7	2.36	4.0	20 41.4	7 5.7	- 0 3.6	+0.6203	0.5520	0.1039	+85	+ 8
120 B. Geminorum	6.5	2.39	4.2	21 23.4	9 49.6	+ 2 34.7	-0.4226	0.5503	0.1090	+16	-49
56 Geminorum	5.2	2.44	5.0	20 35.9	15 16.6	+ 7 50.7	-0.1906	0.5469	0.1187	+29	-37
61 Geminorum	5.8	2.46	5.3	20 25.3	17 35.6	+10 5.2	-0.2791	0.5455	0.1227	+24	-42
<i>g</i> Geminorum	5.0	+2.52	- 7.0	+18 42.6	21 2 38.9	- 5 9.3	+0.3951	0.5398	-0.1376	+64	- 8
209 B. Geminorum	6.2	2.56	7.0	19 32.0	5 24.8	- 2 28.8	-0.8869	0.5381	0.1418	-12	-70
3 Cancri	5.7	2.56	8.2	17 31.9	9 41.6	+ 1 39.9	+0.6689	0.5356	0.1482	+90	+ 6
10 H. Cancri	6.1	2.60	7.9	19 4.3	11 35.6	+ 3 30.2	-1.2925	0.5344	0.1509	-52	-71
ζ Cancri (<i>mean</i>)	4.7	2.62	8.7	17 53.6	15 14.5	+ 7 2.2	-0.5692	0.5323	0.1560	+ 8	-64
<i>d</i> ² Cancri	6.2	+2.66	- 9.6	+17 18.9	21 58.9	-10 25.9	-1.0205	0.5284	-0.1649	-20	-73
90 B. Cancri	6.3	2.67	10.6	15 35.7	22 3 8.5	- 5 25.9	-0.0065	0.5256	0.1711	+39	-33
209 B. Cancri	6.5	2.74	13.3	11 53.7	20 23.8	+11 18.5	+0.9443	0.5172	0.1892	+90	+17
222 B. Cancri	6.3	2.77	13.7	11 50.5	23 0 36.9	- 8 35.8	+0.1979	0.5154	0.1930	+51	-25
ϵ Leonis	5.1	2.80	14.4	11 39.6	8 2.6	- 1 23.0	-1.0583	0.5124	0.1990	-21	-78
<i>h</i> Leonis	5.2	+2.79	-14.7	+10 4.4	8 3.8	- 1 21.8	+0.6888	0.5124	-0.1990	+89	0
<i>o</i> Leonis	3.8	2.82	15.1	10 15.7	12 57.4	+ 3 23.4	-0.5014	0.5107	0.2025	+13	-67
83 B. Leonis	5.9	2.85	15.9	9 19.1	21 10.1	+11 22.2	-1.1424	0.5081	0.2076	-28	-81
89 B. Leonis	6.2	2.85	16.1	8 42.1	22 5.0	-11 44.4	-0.6503	0.5078	0.2081	+ 5	-79
π Leonis	4.9	2.85	16.2	8 26.0	23 13.0	-10 38.4	-0.5899	0.5075	0.2087	+ 8	-75
14 Sextantis	6.3	+2.84	-16.9	+ 6 0.4	24 2 48.2	- 7 9.3	+1.3467	0.5068	-0.2108	+80	+54

ELEMENTS FOR THE

OF OCCULTATIONS.

MARCH.

1000

APRIL.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1918.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i> .	<i>Y</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		$\Delta\alpha$	$\Delta\delta$								
		<i>s</i>	<i>"</i>	<i>°</i> <i>'</i>	<i>d</i> <i>h</i> <i>m</i>	<i>h</i> <i>m</i>				<i>°</i>	<i>°</i>
Sagittarii	3.9	+2.12	+2.8	21 51.7	4 1 29.8	+ 7 18.2	+0.8133	0.5695	+0.1074	+68	+ 8
Sagittarii	3.0	2.08	2.8	21 9.3	3 40.8	+ 9 24.5	+0.3155	0.5694	0.1121	+43	-22
B. Sagittarii	6.3	2.06	2.4	19 56.0	3 42.9	+ 9 26.5	-0.9512	0.5694	0.1122	-28	-90
B. Sagittarii	6.4	2.07	3.2	21 47.7	4 49.5	+10 30.7	+1.1108	0.5693	0.1146	+68	+30
B. Sagittarii	6.4	1.99	2.8	19 23.3	8 46.5	- 9 40.9	-0.9198	0.5690	0.1229	-25	-90
B. Sagittarii	6.1	+1.90	+3.3	19 2.0	15 7.5	- 3 33.7	-0.4614	0.5684	+0.1359	+ 3	-69
B. Sagittarii	5.8	1.88	3.1	18 24.8	15 24.0	- 3 17.8	-1.0649	0.5684	0.1365	-34	-90
Sagittarii	5.1	1.85	4.1	19 57.5	19 22.8	+ 0 32.4	+1.0879	0.5680	0.1444	+70	+27
Sagittarii	6.0	1.81	4.1	19 15.2	21 53.7	+ 2 57.8	+0.7297	0.5677	0.1493	+71	+ 2
B. Capricorni	6.4	1.57	4.4	16 0.7	5 13 42.4	- 5 47.5	-0.0001	0.5657	0.1779	+32	-39
Capricorni	6.2	+1.55	+4.2	15 19.8	14 44.0	- 4 48.3	-0.5112	0.5655	+0.1796	+ 5	-73
Capricorni	5.2	1.51	4.5	15 14.5	18 17.5	- 1 22.3	+0.0491	0.5651	0.1855	+35	-36
B. Capricorni	5.9	1.40	5.0	14 47.9	6 2 45.3	+ 6 47.5	+1.2226	0.5642	0.1984	+75	+38
Aquarii	4.5	1.32	4.4	11 42.2	7 32.2	+11 24.1	-0.9391	0.5637	0.2052	-17	-90
Aquarii	6.5	1.29	4.2	10 56.6	9 35.7	-10 36.7	-1.2778	0.5635	0.2079	-47	-89
Aquarii	5.6	+1.23	+4.3	10 5.8	14 23.3	- 5 59.2	-1.1149	0.5632	+0.2140	-29	-90
B. Aquarii	6.5	1.23	4.9	11 55.4	15 41.5	- 4 43.8	+0.9981	0.5630	0.2156	+78	+18
B. Capricorni	6.2	1.17	4.9	10 56.7	20 37.6	+ 0 1.8	+1.0933	0.5628	0.2212	+79	+24
Capricorni	5.3	1.13	4.6	9 27.5	23 4.1	+ 2 23.1	+0.1482	0.5627	0.2238	+45	-31
Capricorni	6.3	1.13	4.7	9 39.2	23 37.4	+ 2 55.3	+0.4676	0.5627	0.2243	+65	-14
Aquarii	5.6	+1.04	+4.3	6 55.1	7 7 6.4	+10 8.4	-0.5559	0.5626	+0.2313	+ 8	-75
B. Aquarii	6.4	0.99	4.1	5 7.5	11 16.5	- 9 50.3	-1.3671	0.5628	0.2347	-59	-75
Aquarii	5.7	0.98	4.3	5 47.8	13 11.4	- 7 59.4	-0.2482	0.5628	0.2361	+25	-54
Aquarii	5.8	0.95	4.3	5 15.1	16 16.0	- 5 1.4	-0.0590	0.5630	0.2381	+35	-42
3. Aquarii	6.3	0.91	4.0	3 19.8	19 26.0	- 1 58.1	-1.2049	0.5632	0.2400	-33	-90
Aquarii	5.2	+0.90	+4.4	4 39.0	22 15.4	+ 0 45.4	+0.7816	0.5635	+0.2415	+85	+ 3
3. Aquarii	6.3	0.88	4.3	3 58.8	23 35.4	+ 2 2.5	+0.4408	0.5636	0.2421	+66	-16
Piscium	6.2	0.83	4.3	2 50.0	8 7 13.9	+ 9 24.7	+1.1682	0.5646	0.2448	+87	+29
Piscium	6.3	0.81	3.9	0 15.2	8 16.5	+10 25.2	-1.1203	0.5648	0.2450	-25	-90
NEW MOON.											
Arietis	5.0	+0.84	+3.6	20 44.5	12 17 16.8	- 8 31.1	-0.0995	0.5957	+0.1197	+34	-31
Arietis	5.2	0.87	3.6	20 51.2	19 45.2	- 6 8.6	+0.0783	0.5959	0.1137	+44	-21
Arietis	5.2	0.87	3.5	20 27.0	20 21.4	- 5 33.8	+0.5496	0.5960	0.1122	+77	+ 5
Arietis	6.0	0.88	3.5	20 30.9	21 0.8	- 4 55.9	+0.5591	0.5960	0.1106	+78	+ 5
Arietis	6.1	+0.90	+3.8	22 31.4	22 33.5	- 3 27.0	-1.2859	0.5962	+0.1068	-59	-67
I ¹ . Tauri	6.5	0.93	3.3	20 39.0	13 2 42.4	+ 0 31.9	+1.0149	0.5962	0.0964	+90	+35
I ¹ . Tauri	6.1	0.95	3.2	20 40.3	4 50.6	+ 2 35.1	+1.1951	0.5962	0.0910	+90	+51
3. Tauri	5.5	0.97	3.6	23 10.3	6 19.7	+ 4 0.6	-1.1883	0.5962	0.0872	-40	-67
3. Tauri	5.9	0.98	3.3	21 59.8	6 57.5	+ 4 36.9	+0.0489	0.5961	0.0856	+42	-19
Tauri	5.8	+1.00	+3.2	22 14.6	9 40.2	+ 7 13.2	+0.0226	0.5959	+0.0787	+40	-19
Tauri	6.0	1.01	3.4	22 56.4	9 44.4	+ 7 17.2	-0.6739	0.5959	0.0785	+ 1	-64
3. Tauri	6.5	1.02	3.3	22 58.3	11 15.6	+ 8 44.7	-0.5907	0.5958	0.0746	+ 6	-57
Tauri	4.5	1.03	3.0	21 51.6	12 44.2	+10 9.7	+0.6401	0.5957	0.0707	+88	+13
Tauri	6.1	1.04	2.9	21 47.4	12 59.1	+10 24.1	+0.7288	0.5956	0.0701	+90	+19
3. Tauri	6.1	+1.06	+2.9	22 12.3	15 55.8	-10 46.2	+0.5052	0.5952	+0.0624	+74	+ 7
Tauri	6.1	1.12	3.1	24 6.7	20 16.6	- 6 35.8	-1.1839	0.5944	0.0511	-41	-66
Tauri	4.1	1.12	2.6	22 6.5	20 50.4	- 6 3.3	+0.8802	0.5943	0.0496	+90	+30
Tauri	5.4	1.12	2.5	22 0.9	20 51.6	- 6 2.1	+0.9766	0.5943	0.0496	+90	+36
Tauri	4.2	1.13	2.7	22 37.8	21 12.1	- 5 42.4	+0.3683	0.5942	0.0487	+63	+ 1
Tauri	5.4	+1.13	+2.7	22 48.8	21 35.4	- 5 20.1	+0.2000	0.5941	+0.0477	+52	- 9

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

MAY.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.
MAY.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MAY.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.
JUNE.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

JULY.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

THE STAR'S					AT CONJUNCTION IN R. A.						Limiting Parallels.		
Name.	Mag.	Red'ns from 1918.0.		Apparent Declination.	Greenwich Mean Time.			Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		<i>Δα</i>	<i>Δδ</i>		<i>d</i>	<i>h</i>	<i>m</i>						
		<i>s</i>	<i>"</i>	<i>°</i> <i>'</i>	<i>d</i>	<i>h</i>	<i>m</i>	<i>h</i> <i>m</i>				<i>°</i>	<i>'</i>
Sagittarii	4.8	+4.63	+ 1.1	23 48.6	21	1	38.2	8 22.6	+1.0401	0.5788	+0.0470	+66	+26
i. Sagittarii	5.7	4.60	1.5	22 46.7		2	32.0	7 30.8	+0.0044	0.5790	0.0491	+19	39
i. Sagittarii	6.2	4.57	2.3	21 27.2		4	45.2	5 22.5	-1.2670	0.5793	0.0544	-65	-76
Sagittarii	5.2	4.66	2.4	23 43.1		6	36.3	3 35.6	+1.2044	0.5795	0.0587	+66	+43
Sagittarii	5.6	4.60	3.0	21 44.1		7	41.6	2 32.7	-0.8001	0.5797	0.0613	-24	-90
3. Sagittarii	5.7	+4.63	+ 5.6	21 27.9		17	31.1	+ 6 54.7	-0.3618	0.5802	+0.0843	+ 3	-62
3. Sagittarii	5.9	4.62	5.8	21 7.1		17	56.2	+ 7 18.8	-0.6857	0.5802	0.0853	-15	-90
3. Sagittarii	6.3	4.64	6.5	21 5.0		20	36.0	+ 9 52.7	-0.4858	0.5802	0.0914	- 3	-72
Sagittarii	5.6	4.68	6.5	22 28.6		21	0.4	+10 16.2	+0.9948	0.5802	0.0923	+68	+21
Sagittarii	5.3	4.62	7.1	20 25.0		22	25.2	+11 37.8	-1.0056	0.5802	0.0956	-34	-90
Sagittarii	6.2	+4.68	+ 7.0	22 15.3		22	52.9	-11 55.5	+0.9408	0.5802	+0.0966	+68	+17
Sagittarii	5.8	4.66	7.4	21 27.5	22	0	12.3	-10 39.2	+0.2471	0.5801	0.0996	+37	-25
Sagittarii	5.1	4.64	7.8	20 45.7		1	36.3	- 9 18.2	-0.3315	0.5800	0.1027	+ 6	-60
Sagittarii	3.7	4.65	7.8	21 12.8		1	45.5	- 9 9.4	+0.1503	0.5800	0.1031	+32	-30
Sagittarii	3.9	4.68	8.5	21 51.6		4	38.4	- 6 22.9	+1.1236	0.5798	0.1095	+68	+32
3. Sagittarii	5.4	+4.60	+ 9.1	19 25.0		6	10.6	- 4 54.3	-1.2251	0.5797	+0.1129	-53	-89
Sagittarii	3.0	4.66	9.1	21 9.1		6	46.2	- 4 20.0	+0.6310	0.5796	0.1142	+64	- 3
3. Sagittarii	6.3	4.62	9.2	19 55.9		6	48.2	- 4 18.0	-0.6239	0.5796	0.1142	- 8	-85
Sagittarii	5.0	4.60	10.1	19 5.8		10	4.9	- 1 8.6	-1.0950	0.5792	0.1214	-39	-90
3. Sagittarii	6.4	4.61	10.6	19 23.1		11	44.4	+ 0 27.1	-0.5933	0.5790	0.1249	- 5	-81
3. Sagittarii	6.1	+4.60	+12.0	19 1.9		17	56.5	+ 6 25.4	-0.1404	0.5780	+0.1379	+20	-47
3. Sagittarii	5.8	4.58	12.1	18 24.6		18	12.7	+ 6 41.0	-0.7393	0.5779	0.1384	-12	-90
Sagittarii	6.0	4.59	13.6	19 15.0	23	0	34.0	-11 11.7	+1.0395	0.5766	0.1510	+71	+23
3. Capricorni	6.2	4.45	16.3	15 2.4		12	43.2	+ 0 30.8	-1.2781	0.5735	0.1732	-52	-86
Capricorni	3.2	4.45	16.3	15 2.2		12	49.2	+ 0 36.5	-1.2637	0.5735	0.1734	-50	-88
3. Capricorni	6.4	+4.46	+17.0	-16 0.5		16	6.1	+ 3 46.2	+0.3026	0.5726	+0.1789	+49	-22
i. Capricorni	6.2	4.44	17.1	15 19.6		17	6.8	+ 4 44.7	-0.2079	0.5723	0.1806	+21	-51
3. Capricorni	6.1	4.41	17.4	13 59.9		18	27.6	+ 6 2.6	-1.3098	0.5719	0.1827	-57	-80
Capricorni	5.2	4.43	17.8	15 14.3		20	37.6	+ 8 7.9	+0.3466	0.5713	0.1862	+52	-20
3. Capricorni	6.0	4.36	18.6	12 50.6	24	1	33.8	-11 6.6	-1.1400	0.5698	0.1936	-34	-90
Aquarii	4.5	+4.29	+19.9	-11 41.9		9	45.7	- 3 12.3	-0.6613	0.5674	+0.2047	- 1	-86
i. Aquarii	6.5	4.26	20.1	10 56.4		11	48.6	- 1 13.8	-1.0046	0.5668	0.2073	-22	-90
Aquarii	5.6	4.22	20.6	10 5.6		16	35.8	+ 3 23.2	-0.8518	0.5654	0.2128	-11	-90
3. Aquarii	6.5	4.24	21.1	11 55.1		17	54.0	+ 4 38.6	+1.2652	0.5650	0.2143	+78	+42
3. Capricorni	6.2	4.19	21.7	10 56.4		22	50.8	+ 9 25.1	+1.3523	0.5637	0.2193	+73	+57
Capricorni	5.3	+4.16	+21.8	- 9 27.2	25	1	18.0	+11 47.0	+0.3975	0.5631	+0.2216	+60	-18
Capricorni	6.3	4.15	21.9	9 38.9		1	51.4	-11 40.8	+0.7176	0.5630	0.2221	+80	0
Aquarii	5.6	4.07	22.4	6 54.8		9	24.3	- 4 23.7	-0.3309	0.5611	0.2282	-20	-58
3. Aquarii	6.4	4.01	22.4	5 7.2		13	37.6	- 0 19.2	-1.1611	0.5602	0.2310	-31	-90
Aquarii	5.7	4.01	22.8	5 47.4		15	34.3	+ 1 33.5	-0.0369	0.5598	0.2322	+36	-41
Aquarii	5.8	+3.98	+22.9	- 5 14.8		18	42.0	+ 4 34.7	+0.1459	0.5592	+0.2338	+47	-31
3. Aquarii	6.3	3.94	22.8	3 19.5		21	55.7	+ 7 41.7	-1.0228	0.5587	0.2353	-20	-90
Aquarii	5.2	3.92	23.2	4 38.7	26	0	48.7	+10 28.7	+0.9803	0.5583	0.2364	+85	+16
3. Aquarii	6.3	3.91	23.2	3 58.5		2	10.6	+11 47.9	+0.6312	0.5581	0.2368	+81	- 5
i. Piscium	6.2	3.84	23.4	2 49.7		10	1.2	- 4 37.8	+1.3478	0.5572	0.2385	+81	+52
Piscium	6.3	+3.82	+22.9	- 0 14.9		11	5.7	- 3 35.5	-0.9803	0.5571	+0.2387	-16	-90
3. Piscium	6.4	3.73	23.2	- 0 9.1		21	23.4	+ 6 21.0	+1.3821	0.5567	0.2384	+70	+63
Piscium	4.9	3.72	22.9	+ 0 48.8		22	55.3	+ 7 49.8	+0.7798	0.5567	0.2382	+90	+ 3
Piscium	6.4	3.72	23.0	0 40.7		23	3.8	+ 7 58.0	+0.9485	0.5567	0.2381	+90	+14
Piscium	5.7	3.68	22.8	1 39.2	27	3	10.9	+11 56.5	+0.9506	0.5568	0.2372	+90	+14
Piscium	5.4	+3.64	+22.4	+ 3 2.3		7	40.3	- 7 43.3	+0.6252	0.5570	+0.2357	+81	- 5

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.
JULY.

THE STAR'S					AT CONJUNCTIONS IN E. A.					N	S
Name.	Mag.	Right ascen. 1918.	Declina- tion.	Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle H	F	T	P		
		h m	° ' "	° ' "	h m	h m					
36	Pisium	6.2	-3.54	-20.8	7 47.4	27 21 10.4	-5 18.9	-1.0047	0.5554	-0.0284	-28-38
2	Pisium	5.4	3.52	20.7	7 44.4	22 58.1	-7 2.9	-0.5457	0.5558	0.0272	-10-17
136 B.	Pisium	6.5	3.44	19.9	8 54.8	8 6.7	-8 7.6	-0.5138	0.5605	0.0135	-58-31
75	Pisium	6.3	3.37	18.1	12 31.3	19 15.1	-237.4	-0.8325	0.5635	0.0377	-14-17
7	Pisium	3.7	3.30	16.3	14 55.7	29 6 4.7	-10 56.1	-1.1884	0.5694	0.1838	-35-5
107	Pisium	6.2	-3.28	-16.4	-14 14.8	7 56.2	-9 8.6	-0.1451	0.5679	-0.1820	-31-40
47 B.	Arietis	6.5	3.19	13.8	17 38.6	21 36.4	-4 1.9	-1.1178	0.5715	0.1883	-26-13
29 H.	Arietis	6.4	3.18	14.0	16 50.6	22 17.7	-4 41.8	-0.1908	0.5717	0.1881	-28-41
27	Arietis	6.4	3.09	12.8	17 20.7	30 7 22.7	-10 33.2	-0.7545	0.5748	0.1517	-40-12
4	Arietis	5.7	3.08	11.4	19 40.0	12 9.4	-5 57.1	-0.8059	0.5761	0.1424	-14-30
40	Arietis	6.0	-3.03	-11.7	-17 56.8	14 44.8	-3 27.5	-1.2088	0.5768	-0.1373	-20-48
47	Arietis	5.8	3.04	10.3	20 20.6	18 41.2	-0 20.2	-0.7125	0.5781	0.1282	-1-17
8	Arietis	4.5	2.98	9.9	19 25.2	31 0 18.3	-5 44.5	-0.9252	0.5788	0.1173	-40-28
7	Arietis	5.0	2.98	9.2	20 44.6	1 38.8	-7 2.1	-0.2733	0.5805	0.1144	-24-40
7	Arietis	5.2	2.94	8.8	20 51.3	4 15.0	-9 32.4	-0.6988	0.5808	0.1087	-34-30
63	Arietis	5.2	-2.92	-8.9	-20 27.1	4 53.1	-10 9.0	-0.5844	0.5808	-0.1073	-64-4
65	Arietis	6.0	2.92	8.8	20 30.9	5 34.5	-10 48.8	-0.5927	0.5809	0.1058	-64-3
14 H.	Tauri	6.5	2.88	7.9	20 39.1	11 33.0	-7 26.3	-0.8455	0.5822	0.0823	-90-24
22 H.	Tauri	6.1	2.84	7.6	20 40.4	13 47.1	-5 17.1	-1.0287	0.5828	0.0871	-90-30
133 B.	Tauri	5.9	2.84	6.8	21 59.8	15 58.8	-3 9.5	-0.1482	0.5836	0.0820	-30-3
32	Tauri	5.8	-2.82	-6.2	-22 14.7	18 49.7	-0 26.1	-0.1797	0.5834	-0.0753	-29-31
33	Tauri	6.0	2.83	6.0	22 56.4	18 54.2	-0 21.7	-0.8901	0.5834	0.0752	-14-67
161 B.	Tauri	6.5	2.82	5.8	22 58.3	20 29.2	-1 9.7	-0.8076	0.5838	0.0714	-8-67
4	Tauri	4.5	2.78	5.9	21 51.6	22 1.5	-2 38.4	-0.4448	0.5838	0.0877	-68-3
39	Tauri	6.1	-2.78	-5.9	-21 47.4	22 17.1	-2 53.5	-0.5348	0.5838	-0.0871	-76-8

AUGUST.

192 B.	Tauri	6.1	-2.75	-5.3	-22 12.3	1 1 20.9	-5 50.2	-0.3018	0.5841	-0.0596	-58-4
56	Tauri	5.2	2.71	5.1	21 34.7	4 6.4	-8 29.4	-1.1056	0.5842	0.0531	-90-46
κ	Tauri	4.1	-2.70	-4.6	-22 6.5	6 26.5	-10 44.2	-0.6755	0.5843	-0.0475	-90-18
67	Tauri	5.4	2.70	4.6	22 0.9	6 27.7	-10 45.3	-0.7734	0.5843	0.0474	-90-23
ν	Tauri	4.2	2.70	4.4	22 37.8	6 48.9	-11 5.7	-0.1545	0.5844	0.0498	-48-11
72	Tauri	5.4	2.70	4.3	22 48.8	7 13.1	-11 29.0	-0.0171	0.5844	0.0458	-38-20
284 B.	Tauri	6.0	2.68	3.6	23 10.5	10 57.2	-8 55.5	-0.2377	0.5844	0.0385	-25-31
τ	Tauri	4.3	-2.64	-3.4	-22 48.1	13 18.5	-6 39.6	-0.2281	0.5843	-0.0307	-53-5
95	Tauri	6.2	2.66	2.9	23 56.1	13 41.5	-6 17.5	-0.9348	0.5843	0.0288	-17-66
300 B.	Tauri	6.2	2.64	3.0	23 28.8	14 42.5	-5 18.8	-0.4337	0.5843	0.0273	-14-43
99	Tauri	6.0	2.60	2.1	23 49.3	16 38.4	-0 34.2	-0.6853	0.5839	0.0152	-1-62
103	Tauri	5.5	2.56	1.4	24 9.5	23 50.7	-3 28.5	-0.9936	0.5833	-0.0049	-22-56
108	Tauri	6.2	-2.46	-1.5	-22 11.5	2 2 53.2	-6 24.2	-1.0549	0.5829	-0.0026	-90-46
η	Tauri	5.1	2.47	-1.3	22 0.8	4 27.2	-7 54.6	-1.2352	0.5828	0.0064	-84-63
121	Tauri	5.1	2.45	-0.1	23 59.2	11 4.9	-9 42.7	-0.9171	0.5811	0.0224	-16-66
175 H.	Tauri	6.5	2.40	0.2	22 37.2	13 50.3	-7 3.4	-0.4386	0.5803	0.0290	-68-7
394 B.	Tauri	6.0	2.40	0.4	23 10.0	14 21.1	-6 33.8	-0.1473	0.5801	0.0302	-31-25
141	Tauri	6.3	-2.32	-1.3	-22 24.0	22 0.7	-0 48.6	-0.3550	0.5777	-0.0482	-63-0
1	Geminorum	4.3	2.33	1.6	23 16.1	23 0.8	-1 46.5	-0.8051	0.5773	0.0505	-4-57
14 B.	Geminorum	6.0	2.29	1.6	22 12.2	3 1 18.3	-3 58.9	-0.3900	0.5764	0.0557	-64+1
3	Geminorum	5.6	2.31	1.8	23 7.6	1 22.3	-4 2.7	-0.5832	0.5764	0.0558	-6-56
6	Geminorum	6.3	2.29	2.0	22 55.7	2 27.7	-5 5.7	-0.4358	0.5760	0.0583	-14-46
7	Gemin. var.	3.2	-2.27	-2.0	-22 31.9	3 33.0	-6 8.6	-0.0843	0.5755	-0.0608	-34-25

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

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ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.
OCTOBER.

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OCTOBER.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.
OCTOBER.

OVEMBER.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

NOVEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limit- ing Par- allels.		
Name.	Mag.	Red'ns from 1918.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	P	x'	y'	N.	S.	
		Δα	Δδ									
		s	"	°	d	h	m	h	m		°	
16 B. Capricorni	6.2	+3.52	+15.5	-15 2.4	10	0	24.7	- 4 36.1	-0.6613	0.5518	+0.1615	- 5 -87
β Capricorni	3.2	3.53	15.5	15 2.2		0	31.1	- 4 30.0	-0.6470	0.5518	0.1617	- 4 -85
31 B. Capricorni	6.4	3.58	15.7	16 0.6		4	3.2	- 1 5.0	+0.9543	0.5512	0.1669	+74 +17
27 G. Capricorni	6.2	3.57	16.0	15 19.6		5	8.5	- 0 1.9	+0.4212	0.5511	0.1685	+56 -15
45 B. Capricorni	6.1	3.56	16.8	14 0.0		6	35.5	+ 1 22.2	-0.7244	0.5509	0.1705	- 7 -90
τ Capricorni	5.2	+3.61	+16.7	-15 14.3		8	55.2	+ 3 37.3	+0.9735	0.5506	+0.1738	+75 +18
84 B. Capricorni	6.0	3.62	18.3	12 50.6		14	12.9	+ 8 44.3	-0.5897	0.5500	0.1809	+ 2 -78
ν Aquarii	4.5	3.68	19.9	11 41.9		22	58.1	- 6 48.0	-0.1480	0.5492	0.1917	+26 -47
51 G. Aquarii	6.5	3.68	20.4	10 56.4	11	1	8.9	- 4 41.5	-0.5146	0.5491	0.1942	+ 7 -72
17 Aquarii	6.3	3.70	21.5	9 39.8		5	10.6	- 0 47.9	-1.0430	0.5488	0.1986	-25 -90
19 Aquarii	5.6	+3.72	+21.2	-10 5.5		6	13.7	+ 0 13.1	-0.3897	0.5488	+0.1998	+14 -62
ε Aquarii	4.8	3.76	22.7	8 13.0		12	3.2	+ 5 51.0	-1.1427	0.5487	0.2056	-32 -90
c ¹ Capricorni	5.3	3.80	22.7	9 27.2		15	24.6	+ 9 5.7	+0.8266	0.5488	0.2087	+81 + 7
c ² Capricorni	6.3	3.80	22.7	9 38.9		15	59.8	+ 9 39.7	+1.1497	0.5488	0.2093	+80 +30
30 Aquarii	5.6	3.85	24.4	6 54.7		23	53.8	- 6 42.0	+0.0191	0.5492	0.2157	+38 -37
138 B. Aquarii	6.4	+3.87	+25.4	- 5 7.1	12	4	17.3	- 2 27.3	-0.8594	0.5496	+0.2188	-10 -90
44 Aquarii	5.7	3.90	25.4	5 47.4		6	18.3	- 0 30.4	+0.2689	0.5498	0.2202	+53 -24
51 Aquarii	5.8	3.93	25.8	5 14.7		9	32.4	+ 2 37.3	+0.4286	0.5504	0.2221	+64 -15
187 B. Aquarii	6.3	3.95	26.7	3 19.4		12	52.0	+ 5 50.2	-0.7835	0.5509	0.2239	- 5 -90
κ Aquarii	5.2	3.99	26.3	4 38.6		15	49.7	+ 8 41.9	+1.2216	0.5515	0.2253	+85 +37
207 B. Aquarii	6.3	+4.00	+26.7	- 3 58.4		17	13.6	+10 3.0	+0.8562	0.5518	+0.2259	+86 + 9
3 Piscium	6.3	4.08	28.4	- 0 14.8	13	2	18.4	- 5 10.5	-0.8464	0.5540	0.2288	- 8 -90
κ Piscium	4.9	4.21	28.9	+ 0 48.9		14	12.3	+ 6 19.0	+0.8196	0.5579	0.2301	+90 + 7
9 Piscium	6.4	4.21	28.9	0 40.8		14	20.9	+ 6 27.4	+0.9871	0.5580	0.2301	+90 +17
16 Piscium	5.7	4.25	29.3	1 39.3		18	27.0	+10 24.9	+0.9518	0.5595	0.2298	+90 +15
19 Piscium	5.4	+4.30	+29.6	+ 3 2.4		22	54.1	- 9 17.2	+0.5871	0.5613	+0.2290	+77 - 6
36 Piscium	6.2	4.48	30.5	7 47.6	14	12	8.7	+ 3 29.4	-1.1423	0.5678	0.2238	-30 -82
d Piscium	5.4	4.50	30.4	7 44.6		13	53.5	+ 5 10.4	-0.7022	0.5687	0.2228	0 -82
136 B. Piscium	6.5	4.62	29.9	8 55.0		22	43.9	-10 18.3	+0.0796	0.5736	0.2164	+43 -32
75 Piscium	6.3	4.80	29.6	12 31.5	15	9	23.5	- 0 2.3	-1.2305	0.5799	0.2060	-40 -77
101 Piscium	6.2	+4.97	+28.1	+14 15.0		21	24.1	+11 31.1	-0.5436	0.5872	+0.1905	+ 9 -66
20 H ¹ . Arietis	6.4	5.19	25.8	16 50.8	16	10	51.4	+ 0 27.2	-0.6761	0.5951	0.1685	+ 1 -72
27 Arietis	6.4	5.28	23.9	17 20.9		19	18.6	+ 8 34.4	+0.1886	0.5997	0.1523	+50 -18
36 Arietis	6.5	5.33	22.7	17 25.4	17	0	31.0	-10 25.8	+0.8799	0.6023	0.1414	+90 +22
40 Arietis	6.0	5.36	22.3	17 57.0		2	8.4	- 8 52.4	+0.5901	0.6030	0.1379	+80 + 4
45 Arietis	6.0	+5.38	+21.6	+18 0.4		4	56.4	- 6 11.2	+0.9120	0.6042	+0.1317	+90 +25
ρ Arietis	5.6	5.39	21.4	17 42.2		5	10.5	- 5 57.7	+1.2412	0.6043	0.1312	+88 +54
47 Arietis	5.8	5.48	21.5	20 20.8		5	47.1	- 5 22.5	-1.2797	0.6046	0.1299	-55 -70
54 Arietis	6.5	5.43	20.3	18 29.2		9	44.3	- 1 35.0	+1.0460	0.6062	0.1208	+90 +35
δ Arietis	4.5	5.48	20.0	19 25.4		10	58.6	- 0 23.7	+0.2722	0.6066	0.1179	+55 -11
ζ Arietis	5.0	+5.52	+19.6	+20 44.8		12	13.0	+ 0 47.6	-0.8868	0.6070	+0.1149	-14 -69
τ Arietis	5.2	5.55	18.9	20 51.4		14	37.1	+ 3 5.8	-0.7270	0.6078	0.1092	- 3 -69
63 Arietis	5.2	5.53	18.7	20 27.3		15	12.3	+ 3 39.6	-0.2669	0.6080	0.1078	+23 -39
65 Arietis	6.0	5.54	18.5	20 31.1		15	50.4	+ 4 16.1	-0.2616	0.6082	0.1062	+24 -39
14 H ¹ . Tauri	6.5	5.57	16.8	20 39.2		21	21.0	+ 9 33.1	+0.1523	0.6096	0.0925	+47 -15
22 H ¹ . Tauri	6.1	+5.59	+16.1	+20 40.5		23	24.7	+11 31.6	+0.3171	0.6100	+0.0873	+58 - 5
133 B. Tauri	5.9	5.65	15.4	22 0.0	18	1	27.1	-10 31.0	-0.8186	0.6104	0.0821	- 9 -68
32 Tauri	5.8	5.67	14.5	22 14.8		4	3.7	- 8 0.8	-0.8578	0.6108	0.0753	-12 -68
A Tauri	4.5	5.67	13.6	21 51.8		7	0.6	- 5 11.3	-0.2679	0.6110	0.0676	+23 -36
39 Tauri	6.1	5.67	13.4	21 47.5		7	14.9	- 4 57.6	-0.1822	0.6110	0.0669	+28 -31
192 B. Tauri	6.1	+5.68	+12.5	+22 12.4		10	4.4	- 2 15.1	-0.4146	0.6112	+0.0595	+15 -44

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.
NOVEMBER.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

NOVEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1918.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i> .	<i>Y'</i>	<i>x'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
		s	"	"	d h m	h m				"	"
Leonis	6.1	+3.55	-20.8	+ 1 10.1	25 20 37.2	+ 2 3.8	+0.4279	0.5086	-0.2097	+64	-15
Leonis	6.1	5.60	20.7	0 26.1	26 0 53.8	+ 6 12.8	+0.3361	0.5078	0.2098	+58	-20
Leonis	5.3	3.44	20.0	+ 0 22.3	6 23.8	+11 33.5	-0.7463	0.5070	0.2096	- 2	-90
B. Leonis	6.3	5.50	20.4	- 1 15.2	14 4.7	- 4 58.4	-0.5649	0.5084	0.2086	+ 8	-75
Leonis	5.1	3.36	20.0	2 33.4	15 23.8	- 3 41.6	+0.5966	0.5063	0.2084	+78	- 6
B. Leonis	6.2	+3.32	-20.2	- 1 59.3	19 47.9	+ 0 35.3	-0.9460	0.5062	-0.2074	-15	-90
B. Virginis	5.9	3.27	19.4	4 53.0	27 2 40.8	+ 7 16.7	+0.8311	0.5063	0.2055	+85	+ 7
B. Virginis	6.5	3.17	19.0	5 16.1	15 17.8	- 4 27.4	-0.7463	0.5077	0.2006	-49	-88
Virginis	5.3	3.12	17.7	9 0.3	28 1 49.7	+ 5 46.7	+0.7525	0.5097	0.1949	+81	+ 3
B. Virginis	5.5	5.00	16.8	11 12.5	12 48.5	- 7 33.2	+1.0977	0.5127	0.1876	+79	+26
Virginis	5.0	+3.05	-17.3	- 9 5.9	12 49.9	- 7 31.8	-1.2490	0.5127	-0.1876	-43	-90
Virginis	5.2	3.02	16.0	10 18.4	19 59.9	- 0 34.1	-1.2330	0.5120	0.1890	-43	-90
Virginis	5.7	2.98	15.5	12 17.1	29 5 51.4	+ 9 0.2	-0.7887	0.5187	0.1733	-10	-90
B. Virginis	6.0	2.97	15.1	12 47.9	9 58.5	-11 0.1	-0.9248	0.5203	0.1692	-19	-90
Virginis	6.1	2.98	14.2	15 21.6	15 34.5	- 5 33.9	+0.0000	0.5200	0.1634	+75	+19
G. Virginis	6.5	+2.95	-13.2	-15 56.8	30 1 33.3	+ 4 7.0	+0.0010	0.5273	-0.1519	+34	-35
H. Virginis	5.1	+2.94	-13.0	-15 55.1	4 22.7	+ 6 51.2	+0.0000	0.5287	-0.1484	+ 9	-63

DECEMBER.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

DECEMBER.

F

2 2

OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	THE STAR'S		IMMERSION.				EMERSION.				Duration of Occultation.
			Washington.		Angle from—		Washington.		Angle from—		
	Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Vertex.	Sidereal Time.	Mean Time.	North Point.	Vertex.	
			h m	h m	°	°	h m	h m	°	°	h m
a. 5	75 Virginis	5.6	11 3	16 2	97	129	12 19	17 18	326	343	1 18
6	231 G. Virginis	† 6.4	8 21	13 16	100	152	9 19	14 14	308	357	0 58
6	236 G. Virginis	† 5.7	9 8	14 4	92	142	10 8	15 3	318	3	0 59
7	64 G. Libræ	5.8	12 23	17 14	118	151	13 42	18 33	286	306	1 19
8	41 G. Scorpii	6.3	13 10	17 57	116	150	14 26	19 13	274	296	1 16
19	20 H¹. Arietis	6.4	4 49	8 54	119	68	5 40	9 45	208	154	0 51
20	ζ Arietis	5.0	9 22	13 22	101	48	10 14	14 14	250	202	0 52
21	161 B. Tauri	6.5	3 25	7 23	32	53	4 25	8 23	305	284	1 0
22	99 Tauri	6.0	2 28	6 22	72	128	3 49	7 43	273	313	1 21
23	1 Geminorum	4.3	8 17	12 6	91	37	9 31	13 20	297	239	1 14
23	3 Geminorum	5.6	11 32	15 20	32	336	11 49	15 38	357	302	0 17
23	6 Geminorum	6.3	12 32	16 20	54	2	13 7	16 55	331	282	0 35
24	d Geminorum	5.2	3 16	7 1	105	162	4 34	8 20	268	320	1 19
25	3 Cancri	5.7	14 5	17 45	138	86	14 53	18 33	264	214	0 48
26	90 B. Cancri	6.3	4 27	8 5	104	158	5 44	9 22	293	343	1 17
27	h Leonis	5.2	11 25	14 58	149	112	12 36	16 9	276	228	1 11
29	p³ Leonis	6.1	13 12	16 37	91	56	14 19	17 44	333	289	1 7
b. 3	43 B. Libræ	5.7	15 13	18 18	95	90	16 42	19 47	299	275	1 29
5	126 B. Scorpii	† 6.1	11 58	14 55	69	116	12 53	15 50	317	358	0 56
17	133 B. Tauri	5.9	7 20	9 31	133	76	8 9	10 20	222	165	0 48
17	32 Tauri	† 5.8	10 21	12 32	81	30	11 13	13 24	278	231	0 52
18	300 B. Tauri	6.2	5 48	7 55	98	58	7 11	9 18	264	208	1 23
25	237 B. Leonis	† 6.3	16 3	17 41	137	86	17 0	18 38	273	222	0 57
26	e Leonis	5.1	11 56	13 30	146	137	13 18	14 52	286	257	1 22
28	370 B. Virginis	6.0	8 44	10 11	185	230	9 13	10 40	234	277	0 29
ur. 1	83 Virginis	5.6	11 7	12 30	149	182	12 18	13 41	272	291	1 10
4	19 Scorpii	4.9	12 49	14 0	121	160	14 3	15 14	269	297	1 14
17	72 Tauri	5.4	7 28	7 48	109	52	8 35	8 55	254	196	1 7
19	μ Geminorum	3.2	7 20	7 33	72	35	8 30	8 42	318	265	1 10
28	75 Virginis	5.6	14 13	13 49	174	164	15 3	14 39	242	220	0 50
29	43 H. Virginis	5.5	9 51	9 24	146	191	10 51	10 24	266	306	1 0
29	236 G. Virginis	5.7	12 30	12 2	187	210	12 59	12 32	229	246	0 30
31	57 B. Scorpii	5.7	14 40	14 5	100	117	16 11	15 35	285	283	1 30
31	27 G. Scorpii	5.8	16 30	15 55	90	84	18 0	17 24	282	258	1 30
or. 2	4 Sagittarii	4.8	16 28	15 45	53	72	17 43	16 59	298	301	1 14
3	30 Sagittarii	† 6.2	13 30	12 43	52	103	14 22	13 35	304	350	0 52
4	57 Sagittarii	6.0	16 13	15 22	36	76	17 9	16 18	298	331	0 56
7	κ Aquarii	† 5.2	16 32	15 29	30	82	17 16	16 13	285	336	0 44
13	Δ Tauri	4.5	9 56	8 31	118	65	10 43	9 18	243	192	0 47
13	39 Tauri	6.1	10 16	8 51	137	84	10 52	9 27	224	174	0 36
15	141 Tauri	6.3	8 38	7 5	145	90	9 33	8 0	242	184	0 55
15	14 B. Geminorum	6.0	12 13	10 39	90	37	13 4	11 30	295	245	0 51
19	h Leonis	5.2	11 31	9 41	65	26	12 13	10 24	358	313	0 42
21	p³ Leonis	6.1	13 52	11 54	61	20	14 31	12 33	359	314	0 39
22	13 B. Virginis	5.9	16 30	14 28	92	43	17 30	15 28	314	262	1 0
y 12	175 H¹. Tauri	† 6.5	12 22	9 2	61	11	13 1	9 41	317	270	0 39
17	14 Sextantis	† 6.3	16 8	12 27	107	55	17 3	13 23	299	250	0 55
19	e Leonis	5.1	13 18	9 30	58	28	13 54	10 6	5	329	0 36

NOTE.—The angles of position are counted from the north point and vertex of the Moon's limb toward the east.
† Immersion below the horizon of Washington. ‡ Emersion below the horizon of Washington.

OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	THE STAR'S		IMMERSION.				EMERSION.				Duration of Occultation.
			Washington.		Angle from—		Washington.		Angle from—		
	Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Vertex.	Sidereal Time.	Mean Time.	North Point.	Vertex.	
			h m	h m	°	°	h m	h m	°	°	h m
May 22	83 Virginis	5.6	11 58	7 59	166	189	12 57	8 57	254	264	0 58
26	39 Ophiuchi	5.1	13 12	8 57	150	193	13 56	9 40	226	263	0 43
26	191 B. Ophiuchi	6.3	17 7	12 52	105	108	18 31	14 15	248	233	1 24
26	b Ophiuchi	4.3	17 56	13 40	92	84	19 21	15 5	255	230	1 25
June 2	19 Piscium	5.4	18 16	13 33	30	82	19 5	14 21	278	329	0 48
12	α Cancri	† 4.3	15 18	9 55	174	123	15 44	10 21	231	181	0 28
18	75 Virginis	5.6	17 20	11 34	124	80	18 29	12 42	270	220	1 9
19	43 H. Virginis	5.5	12 48	6 58	87	106	14 6	8 16	325	326	1 18
19	231 G. Virginis	6.4	14 16	8 26	128	127	15 44	9 54	278	257	1 28
19	236 G. Virginis	5.7	15 27	9 37	122	105	16 53	11 3	276	243	1 25
21	57 B. Scorpii	5.7	17 8	11 10	119	104	18 26	12 28	249	220	1 15
21	27 G. Scorpii	5.8	18 53	12 55	132	98	19 50	13 51	228	187	0 56
23	4 Sagittarii	4.8	16 52	10 46	111	125	18 9	12 3	237	234	1 17
24	30 Sagittarii	† 6.2	13 22	7 12	122	174	14 13	8 4	233	279	0 51
25	57 Sagittarii	6.0	15 32	9 19	114	159	16 29	10 16	222	261	0 57
27	ε² Capricorni	6.3	18 24	12 2	41	82	19 31	13 9	267	297	1 7
28	κ Aquarii	5.2	17 34	11 8	93	143	18 30	12 4	217	263	0 56
28	207 B. Aquarii	6.3	19 32	13 6	34	75	20 38	14 12	266	296	1 5
July 20	51 Ophiuchi	4.8	15 21	7 29	65	91	16 37	8 45	298	310	1 16
23	τ Capricorni	5.2	0 26	16 20	40	358	1 22	17 17	268	219	0 56
31	A Tauri	4.5	23 53	15 16	67	125	1 0	16 24	262	318	1 7
31	39 Tauri	6.1	0 9	15 32	90	148	1 16	16 40	239	294	1 8
Aug. 2	141 Tauri	6.3	23 52	15 8	58	111	0 43	15 58	296	352	0 51
11	370 B. Virginis	6.0	15 59	6 40	110	71	17 15	7 56	294	247	1 16
18	π Sagittarii	3.0	21 36	11 50	82	51	22 45	12 58	236	195	1 8
27	14 H¹. Tauri	6.5	20 40	10 17	46	96	21 24	11 2	284	337	0 45
27	22 H¹. Tauri	6.1	22 50	12 28	122	179	23 31	13 8	203	260	0 40
Sept. 16	τ Capricorni	5.2	23 58	12 17	70	30	1 2	13 20	238	191	1 3
19	κ Piscium	4.9	0 7	12 14	76	61	1 17	13 23	220	189	1 9
19	9 Piscium	6.4	0 23	12 30	117	99	1 0	13 7	179	152	0 37
22	27 Arietis	6.4	4 49	16 43	78	30	6 0	17 54	254	200	1 11
24	51 Tauri	5.6	21 10	8 58	95	144	21 59	9 47	242	294	0 49
24	56 Tauri	5.2	21 40	9 27	66	117	22 31	10 19	270	325	0 52
24	67 Tauri	5.4	0 15	12 2	34	92	1 4	12 51	300	357	0 49
25	n Tauri	† 5.1	21 32	9 16	101	146	22 20	10 4	248	297	0 48
29	209 B. Cancri	6.5	5 21	16 47	105	157	6 39	18 6	299	343	1 18
Oct. 20	36 Arietis	6.5	20 16	6 22	93	145	21 4	7 9	229	283	0 48
20	40 Arietis	6.0	22 1	8 7	58	114	23 0	9 5	260	314	0 58
25	2 B. Cancri	6.0	3 9	12 53	155	210	3 48	13 33	227	281	0 40
25	5 Cancri	5.9	4 35	14 20	130	183	5 48	15 32	260	307	1 12
Nov. 7	21 G. Sagittarii	5.7	19 30	4 26	90	70	20 50	5 45	244	210	1 20
8	ε Sagittarii	3.7	20 54	5 45	126	100	21 38	6 29	195	162	0 44
8	36 Sagittarii	5.1	21 14	6 5	0	330	21 40	6 30	322	288	0 26
16	27 Arietis	6.4	6 43	15 0	49	354	7 35	15 52	291	236	0 52
18	51 Tauri	5.6	21 18	5 30	39	88	21 57	6 8	299	351	0 38
18	247 B. Tauri	5.8	1 12	9 23	137	193	1 49	10 0	200	254	0 37
19	o Tauri	4.8	23 21	7 28	86	139	0 17	8 24	262	318	0 56
20	15 Geminorum	† 6.5	23 1	7 4	79	126	23 51	7 54	282	333	0 50

NOTE.—The angles of position are counted from the north point and vertex of the Moon's limb toward the east.
† Immersion below the horizon of Washington. ‡ Emerison below the horizon of Washington.

OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	THE STAR'S		IMMERSION.				EMERSION.				Dura- tion of Occul- tation.
			Washington.		Angle from—		Washington.		Angle from—		
	Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	
			h m	h m	°	°	h m	h m	°	°	h m
v. 20	16 Geminorum	6.2	23 19	7 22	155	204	23 41	7 44	206	256	0 22
21	f Geminorum	5.3	5 43	13 42	128	172	7 1	14 59	265	284	1 18
23	ω Leonis	5.5	10 9	17 59	164	146	11 12	19 1	259	224	1 3
24	14 Sextantis	6.3	4 3	11 50	164	215	4 38	12 25	236	288	0 36
25	237 B. Leonis †	6.3	4 9	11 52	154	204	4 51	12 34	248	300	0 42
25	55 Leonis	6.1	5 55	13 38	136	187	7 0	14 42	275	322	1 4
e. 6	266 B. Sagittarii	6.1	21 48	4 49	66	37	23 2	6 2	247	207	1 13
7	27 G. Capricorni	6.2	23 6	6 2	45	12	0 13	7 9	261	219	1 8
9	44 Aquarii	5.7	1 6	7 54	39	1	2 11	8 59	261	215	1 5
14	40 Arietis	6.0	22 50	5 19	75	131	23 56	6 24	241	293	1 5
16	108 Tauri	6.2	10 6	16 25	27	330	10 25	16 44	349	293	0 19
16	n Tauri	5.1	11 28	17 47	50	358	12 3	18 22	325	275	0 35
19	2 B. Cancri	6.0	1 17	7 26	98	149	2 14	8 22	279	333	0 56
19	5 Cancri	5.9	2 35	8 44	87	141	3 37	9 46	295	349	1 2
23	e Leonis	5.1	11 59	17 51	95	84	13 15	19 7	331	302	1 16

NOTE.—The angles of position are counted from the north point and vertex of the Moon's limb toward the east.
† Immersion below the horizon of Washington.

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SUN, 1918.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN.

FOR GREENWICH MEAN NOON.

Date.	<i>P</i>	<i>B</i> ₀	<i>L</i> ₀	Date.	<i>P</i>	<i>B</i> ₀	<i>L</i> ₀
	°	°	°		°	°	°
Jan. 1	+ 2.11	−3.13	25.20	July 5	− 0.99	+3.40	103.42
6	− 0.32	3.70	319.35	10	+ 1.29	3.92	37.25
11	2.74	4.24	253.51	15	3.54	4.41	331.00
16	5.12	4.74	187.68	20	5.74	4.87	264.93
21	7.43	5.21	121.84	25	7.90	5.30	198.78
26	− 9.65	−5.64	56.01	30	+ 9.97	+5.70	132.64
31	11.78	6.02	350.17	Aug. 4	11.97	6.05	66.51
Feb. 5	13.80	6.35	284.34	9	13.87	6.36	0.40
10	15.70	6.64	218.51	14	15.66	6.63	294.31
15	17.46	6.87	152.67	19	17.34	6.86	228.22
20	−19.08	−7.05	86.83	24	+18.90	+7.03	162.14
25	20.55	7.17	20.97	29	20.33	7.15	96.06
Mar. 2	21.86	7.24	315.11	Sept. 3	21.63	7.23	30.04
7	23.02	7.25	249.23	8	22.78	7.25	324.01
12	24.02	7.20	183.35	13	23.79	7.22	257.99
17	−24.85	−7.10	117.45	18	+24.64	+7.14	191.98
22	25.51	6.95	51.53	23	25.34	7.00	125.98
27	25.99	6.75	345.59	28	25.86	6.81	59.99
Apr. 1	26.30	6.50	279.63	Oct. 3	26.22	6.58	354.02
6	26.42	6.19	213.65	8	26.40	6.29	288.05
11	−26.37	−5.85	147.66	13	+26.40	+5.95	222.09
16	26.13	5.46	81.64	18	26.21	5.57	156.14
21	25.70	5.03	15.61	23	25.83	5.15	90.19
26	25.10	4.57	309.55	28	25.26	4.69	24.26
May 1	24.30	4.08	243.47	Nov. 2	24.49	4.19	318.32
6	−23.33	−3.56	177.38	7	+23.52	+3.66	252.40
11	22.18	3.02	111.27	12	22.35	3.10	186.48
16	20.86	2.45	45.14	17	21.00	2.51	120.57
21	19.38	1.87	339.00	22	19.46	1.90	54.66
26	17.75	1.28	272.85	27	17.74	1.28	348.76
31	−15.97	−0.68	206.68	Dec. 2	+15.86	+0.64	282.86
June 5	14.07	−0.08	140.51	7	13.83	0.00	216.98
10	12.06	+0.52	74.34	12	11.67	−0.64	151.10
15	9.95	1.12	8.16	17	9.41	1.27	85.22
20	7.77	1.71	301.97	22	7.07	1.90	19.35
25	− 5.54	+2.29	235.78	27	+ 4.67	−2.51	313.49
30	− 3.27	+2.86	169.60	32	+ 2.23	−3.10	247.64

In the above table, *P* is the position-angle of the axis of rotation measured eastward from the north point of the disk, while *L*₀ and *B*₀ are the heliographic longitudes and latitudes, respectively, of the center of the disk. The longitudes are reckoned from the Solar Meridian which passed through the ascending node of the Sun's equator on the ecliptic, on January 1, 1854, Greenwich Mean Noon.

MEAN EQUATOR, ORBIT, AND MEAN LONGITUDE.

FOR

MEAN NOON.

M

E

Daily motion of J' +8'.684
 Daily motion of Q -3'.177

EPHEMERIS FOR
FOR

OBSERVATIONS OF THE MOON
MEAN

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

FOR

MEAN

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.
FOR GREENWICH MEAN MIDNIGHT.

Date.		The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
		Long.	Lat.	Long.	Lat.	Colong.	Lat.	
	
Apr.	1	−6.75	+1.67	−0.02	+0.04	156.17	+1.50	9.00
	2	7.33	+0.23	0.02	0.04	168.35	1.48	4.30
	3	7.61	−1.25	0.02	0.04	180.54	1.46	358.71
	4	7.53	2.71	0.02	0.04	192.73	1.44	353.16
	5	7.02	4.05	0.02	0.04	204.93	1.42	347.98
	6	−6.05	−5.19	−0.02	+0.04	217.14	+1.40	343.47
	7	4.63	6.03	0.02	0.04	229.35	1.39	339.87
	8	2.84	6.48	0.02	0.04	241.57	1.37	337.40
	9	−0.80	6.49	0.02	0.04	253.80	1.36	336.28
	10	+1.31	6.03	0.02	0.04	266.02	1.35	336.68
	11	+3.28	−5.15	−0.02	+0.04	278.25	+1.34	338.68
	12	4.96	3.93	0.01	0.04	290.48	1.33	342.19
	13	6.20	2.48	0.01	0.04	302.70	1.32	346.94
	14	6.97	−0.93	0.01	0.04	314.92	1.32	352.46
	15	7.25	+0.63	0.01	0.04	327.14	1.31	358.25
	16	+7.08	+2.12	−0.01	+0.04	339.35	+1.31	3.85
	17	6.54	3.45	0.01	0.04	351.55	1.30	8.96
	18	5.71	4.59	0.01	0.04	3.75	1.30	13.40
	19	4.65	5.51	0.01	0.04	15.94	1.30	17.10
	20	3.46	6.17	0.01	0.04	28.13	1.29	20.02
	21	+2.19	+6.56	−0.01	+0.04	40.32	+1.28	22.13
	22	+0.90	6.67	0.01	0.04	52.50	1.28	23.41
	23	−0.37	6.50	0.02	0.04	64.68	1.26	23.79
	24	1.58	6.04	0.02	0.04	76.85	1.25	23.21
	25	2.71	5.31	0.02	0.04	89.03	1.23	21.62
	26	−3.74	+4.34	−0.02	+0.04	101.20	+1.21	18.97
	27	4.65	3.16	0.02	0.04	113.38	1.18	15.31
	28	5.43	1.81	0.02	0.04	125.56	1.16	10.77
	29	6.03	+0.35	0.02	0.04	137.74	1.13	5.56
	30	6.42	−1.14	0.02	0.04	149.92	1.10	0.02
May	1	−6.56	−2.61	−0.02	+0.04	162.12	+1.07	354.48
	2	6.40	3.97	0.02	0.04	174.32	1.04	349.28
	3	5.92	5.13	0.02	0.04	186.52	1.01	344.67
	4	5.07	6.01	0.02	0.04	198.73	0.98	340.88
	5	3.88	6.54	0.02	0.04	210.95	0.95	338.09
	6	−2.40	−6.66	−0.01	+0.04	223.18	+0.92	336.50
	7	−0.72	6.34	0.01	0.04	235.41	0.90	336.28
	8	+1.03	5.58	0.01	0.04	247.65	0.87	337.59
	9	2.71	4.45	0.01	0.04	259.89	0.85	340.45
	10	4.17	3.04	0.01	0.04	272.13	0.83	344.72
	11	+5.30	−1.46	−0.01	+0.04	284.38	+0.81	350.04
	12	6.05	+0.18	0.01	0.04	296.61	0.79	355.89
	13	6.37	1.76	0.01	0.04	308.85	0.78	1.75
	14	6.28	3.20	0.01	0.04	321.08	0.76	7.20
	15	5.83	4.44	0.01	0.04	333.31	0.75	12.00
	16	+5.07	+5.45	−0.01	+0.04	345.53	+0.73	16.03
	17	+4.07	+6.18	−0.01	+0.04	357.75	+0.72	19.24

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

FOR

MEAN

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

FOR GREENWICH MEAN MIDNIGHT.

Date.		The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
		Long.	Lat.	Long.	Lat.	Colong.	Lat.	
	
July	1	+1.04	−6.09	0.00	+0.04	187.35	−0.48	336.58
	2	2.05	5.18	0.00	0.04	199.58	0.52	338.44
	3	2.95	3.96	0.00	0.04	211.82	0.55	341.60
	4	3.72	2.51	+0.01	0.04	224.06	0.58	346.16
	5	4.30	−0.94	0.01	0.04	236.30	0.60	351.53
	6	+4.69	+0.68	+0.01	+0.04	248.56	−0.63	357.34
	7	4.86	2 22	0.01	0.04	260.81	0.66	3 13
	8	4.80	3.63	0.01	0.04	273.06	0.68	8.51
	9	4.50	4.82	0.01	0.04	285.31	0.70	13.21
	10	3.96	5.74	0.01	0.04	297.56	0.72	17.12
	11	+3.18	+6.39	+0.01	+0.04	309.81	−0.74	20.16
	12	2.21	6.73	0.01	0.04	322.05	0.76	22.31
	13	+1.07	6.77	0.01	0.04	334.29	0.77	23.57
	14	−0.16	6.52	0.01	0.04	346.52	0.79	23.99
	15	1.44	5.99	0.01	0.04	358.75	0.80	23.27
	16	−2.69	+5.21	+0.01	+0.04	10.97	−0.82	21.63
	17	3.82	4.18	0.01	0.04	23.19	0.84	18.95
	18	4.76	2.96	0.00	0.04	35.40	0.85	15.25
	19	5.43	1.56	0.00	0.04	47.60	0.87	10.62
	20	5.78	+0.06	0.00	0.04	59.80	0.89	5.27
	21	−5.76	−1.48	+0.01	+0.04	71.99	−0.91	359.52
	22	5.35	2.98	0.01	0.04	84.18	0.94	353.77
	23	4.57	4.34	0.01	0.04	96.37	0.96	348.39
	24	3.48	5.46	0.01	0.04	108.56	0.98	343.72
	25	2.17	6.24	0.01	0.04	120.76	1.01	340.02
	26	−0.74	−6.62	+0.01	+0.04	132.95	−1.03	337.47
	27	+0.68	6.57	0.01	0.04	145.15	1.06	336.20
	28	2.00	6.10	0.01	0.04	157.35	1.08	336.33
	29	3.13	5.26	0.01	0.04	169.56	1.10	337.89
	30	4.03	4.10	0.01	0.04	181.78	1.13	340.84
	31	+4.69	−2.72	+0.01	+0.04	194.00	−1.15	345.01
Aug.	1	5.11	−1.20	0.01	0.04	206.23	1.17	350.13
	2	5.31	+0.36	0.01	0.04	218.47	1.20	355.77
	3	5.30	1.88	0.02	0.04	230.71	1.22	1.51
	4	5.11	3.27	0.02	0.04	242.95	1.24	6.96
	5	+4.74	+4.48	+0.02	+0.04	255.20	−1.26	11.85
	6	4.18	5.45	0.02	0.04	267.45	1.27	15.99
	7	3.46	6.15	0.02	0.04	279.70	1.29	19.31
	8	2.56	6.55	0.02	0.04	291.94	1.30	21.76
	9	1.50	6.65	0.02	0.04	304.19	1.31	23.31
	10	+0.31	+6.46	+0.02	+0.04	316.43	−1.32	23.93
	11	−0.97	6.00	0.01	0.04	328.66	1.32	23.60
	12	2.30	5.28	0.01	0.04	340.89	1.34	22.28
	13	3.59	4.33	0.01	0.04	353.11	1.35	19.96
	14	4.77	3.18	0.01	0.04	5.33	1.35	16.64
	15	−5.76	+1.87	+0.01	+0.04	17.54	−1.36	12.39
	16	−6.45	+0.44	+0.01	+0.04	29.75	−1.37	7.37

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.
FOR GREENWICH MEAN MIDNIGHT.

Date.		The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
		Long.	Lat.	Long.	Lat.	Colong.	Lat.	
		•	•	•	•	•	•	•
Aug.	16	−6.45	+0.44	+0.01	+0.04	29.75	−1.37	7.37
	17	6.79	−1.05	0.01	0.04	41.94	1.38	1.81
	18	6.68	2.52	0.01	0.04	54.14	1.38	356.07
	19	6.10	3.90	0.01	0.04	66.32	1.39	350.51
	20	5.07	5.08	0.01	0.04	78.51	1.40	345.49
	21	−3.63	−5.95	+0.01	+0.04	90.69	−1.41	341.31
	22	1.91	6.45	0.01	0.03	102.86	1.42	338.23
	23	−0.05	6.50	0.02	0.03	115.04	1.43	336.45
	24	+1.77	6.11	0.02	0.03	127.23	1.44	336.12
	25	3.39	5.31	0.02	0.03	139.41	1.45	337.29
	26	+4.72	−4.18	+0.02	+0.03	151.61	−1.46	339.96
	27	5.68	2.81	0.02	0.03	163.81	1.47	343.94
	28	6.29	−1.30	0.02	0.03	176.01	1.48	348.92
	29	6.56	+0.24	0.02	0.04	188.22	1.48	354.49
	30	6.53	1.74	0.02	0.04	200.44	1.50	0.21
	31	+6.25	+3.12	+0.02	+0.04	212.66	−1.52	5.71
Sept.	1	5.76	4.32	0.02	0.04	224.89	1.52	10.70
	2	5.11	5.30	0.02	0.04	237.12	1.53	15.00
	3	4.31	6.01	0.02	0.04	249.36	1.54	18.53
	4	3.38	6.43	0.02	0.04	261.59	1.55	21.21
	5	+2.33	+6.57	+0.02	+0.04	273.83	−1.56	23.00
	6	+1.16	6.41	0.02	0.04	286.06	1.56	23.89
	7	−0.10	5.98	0.02	0.04	298.30	1.56	23.82
	8	1.43	5.28	0.02	0.04	310.53	1.56	22.78
	9	2.79	4.37	0.02	0.04	322.75	1.56	20.74
	10	−4.12	+3.26	+0.02	+0.04	334.97	−1.55	17.72
	11	5.34	2.00	0.02	0.04	347.19	1.54	13.80
	12	6.38	+0.63	0.02	0.04	359.40	1.54	9.09
	13	7.15	−0.80	0.02	0.04	11.60	1.53	3.81
	14	7.54	2.23	0.02	0.04	23.79	1.53	358.24
	15	−7.49	−3.59	+0.02	+0.04	35.98	−1.52	352.71
	16	6.93	4.79	0.02	0.03	48.16	1.51	347.52
	17	5.85	5.73	0.02	0.03	60.33	1.51	343.00
	18	4.29	6.33	0.02	0.03	72.50	1.50	339.42
	19	2.38	6.51	0.02	0.03	84.67	1.50	337.02
	20	−0.26	−6.23	+0.02	+0.03	96.83	−1.49	336.04
	21	+1.85	5.50	0.02	0.03	109.00	1.48	336.63
	22	3.77	4.40	0.02	0.03	121.16	1.47	338.83
	23	5.36	3.01	0.02	0.03	133.34	1.47	342.52
	24	6.53	−1.46	0.02	0.03	145.51	1.46	347.39
	25	+7.25	+0.13	+0.02	+0.03	157.69	−1.46	352.99
	26	7.56	1.67	0.02	0.03	169.88	1.45	358.82
	27	7.48	3.08	0.02	0.03	182.07	1.45	4.47
	28	7.10	4.31	0.02	0.03	194.27	1.44	9.62
	29	6.46	5.29	0.03	0.04	206.48	1.44	14.09
	30	+5.62	+6.02	+0.03	+0.04	218.69	−1.44	17.79
Oct.	1	+4.64	+6.46	+0.03	+0.04	230.90	−1.44	20.87

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.
FOR GREENWICH MEAN MIDNIGHT.

Date.		The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
		Long.	Lat.	Long.	Lat.	Colong.	Lat.	
	
Oct.	1	+4.64	+6.46	+0.03	+0.04	230.90	−1.44	20.67
	2	3.54	6.61	0.02	0.04	243.12	1.43	22.66
	3	2.35	6.46	0.02	0.04	255.34	1.43	23.79
	4	+1.09	6.04	0.02	0.04	267.56	1.42	23.96
	5	−0.23	5.36	0.02	0.04	279.78	1.41	23.16
	6	−1.57	+4.45	+0.02	+0.04	292.00	−1.40	21.37
	7	2.91	3.35	0.02	0.04	304.22	1.39	18.59
	8	4.21	2.09	0.02	0.04	316.43	1.38	14.89
	9	5.40	+0.73	0.02	0.04	328.63	1.36	10.40
	10	6.42	−0.69	0.02	0.03	340.84	1.34	5.33
	11	−7.20	−2.10	+0.02	+0.03	353.03	−1.32	359.93
	12	7.65	3.44	0.02	0.03	5.22	1.30	354.50
	13	7.69	4.64	0.02	0.03	17.40	1.28	349.32
	14	7.26	5.63	0.02	0.03	29.58	1.26	344.66
	15	6.32	6.31	0.02	0.03	41.74	1.24	340.77
	16	−4.90	−6.61	+0.02	+0.03	53.89	−1.22	337.89
	17	3.08	6.47	0.02	0.03	66.06	1.20	336.27
	18	−1.01	5.88	0.02	0.03	78.21	1.18	336.12
	19	+1.15	4.86	0.02	0.03	90.36	1.15	337.60
	20	3.20	3.50	0.02	0.03	102.50	1.13	340.73
	21	+4.96	−1.91	+0.02	+0.03	114.65	−1.10	345.29
	22	6.34	−0.23	0.02	0.03	126.81	1.08	350.85
	23	7.26	+1.42	0.02	0.03	138.96	1.06	356.86
	24	7.72	2.93	0.02	0.03	151.13	1.04	2.79
	25	7.76	4.24	0.02	0.03	163.30	1.02	8.25
	26	+7.42	+5.30	+0.02	+0.03	175.47	−1.01	13.01
	27	6.77	6.08	0.02	0.03	187.65	0.99	16.96
	28	5.88	6.56	0.02	0.03	199.84	0.98	20.07
	29	4.80	6.74	0.02	0.03	212.03	0.96	22.30
	30	3.60	6.63	0.02	0.03	224.23	0.95	23.64
	31	+2.32	+6.23	+0.02	+0.03	236.43	−0.94	24.05
Nov.	1	+1.00	5.57	0.02	0.04	248.63	0.92	23.50
	2	−0.32	4.66	0.02	0.03	260.84	0.90	21.94
	3	1.62	3.56	0.02	0.03	273.04	0.89	19.39
	4	2.88	2.29	0.02	0.03	285.25	0.87	15.88
	5	−4.04	+0.91	+0.02	+0.03	297.45	−0.84	11.54
	6	5.09	−0.53	0.02	0.03	309.65	0.82	6.56
	7	5.96	1.96	0.02	0.03	321.84	0.80	1.22
	8	6.61	3.33	0.02	0.03	334.03	0.77	355.82
	9	6.98	4.55	0.01	0.03	346.22	0.74	350.63
	10	−7.02	−5.57	+0.01	+0.03	358.39	−0.71	345.92
	11	6.68	6.31	0.01	0.03	10.56	0.68	341.90
	12	5.94	6.70	0.01	0.03	22.72	0.65	338.76
	13	4.79	6.70	0.01	0.03	34.88	0.62	336.70
	14	3.29	6.26	0.01	0.03	47.03	0.59	335.95
	15	−1.54	−5.40	+0.02	+0.03	59.17	−0.55	336.69
	16	+0.35	−4.15	+0.02	+0.03	71.31	−0.52	339.06

EPHEMERIS FOR

OBSERVATIONS OF THE MOON.

FOR

MEAN

622 ILLUMINATED DISK OF MERCURY, 1918.

FOR GREENWICH MEAN NOON.

Date.	<i>k</i>	<i>i</i>	θ	<i>L</i>	Stellar Mag.	Date.	<i>k</i>	<i>i</i>	θ	<i>L</i>	Stellar Mag.
		°	°					°	°		
Jan. 1	0.019	164	328	4.8	+2.3	July 5	0.929	31	359	52.5	-1.1
6	0.045	155	200	10.5	2.0	10	0.856	45	6	44.6	0.7
11	0.209	126	189	35.2	0.9	15	0.781	56	12	38.8	-0.3
16	0.390	103	185	44.6	0.4	20	0.709	65	16	35.1	0.0
21	0.535	86	181	42.5	0.2	25	0.640	74	19	33.0	+0.2
26	0.642	73	177	37.7	+0.1	30	0.571	82	22	32.0	+0.4
31	0.722	64	173	33.3	0.0	Aug. 4	0.499	90	24	31.7	0.6
Feb. 5	0.782	56	169	30.1	0.0	9	0.419	99	27	31.4	0.7
10	0.830	49	165	28.1	-0.1	14	0.328	110	30	30.2	0.9
15	0.869	42	160	27.4	0.2	19	0.225	123	33	26.1	1.2
20	0.903	36	156	27.7	-0.3	24	0.118	140	39	17.3	+1.7
25	0.934	30	151	29.2	0.5	29	0.032	159	55	5.8	2.5
Mar. 2	0.962	22	146	32.3	0.7	Sept. 3	0.012	168	149	2.2	2.8
7	0.986	14	136	37.2	1.1	8	0.090	145	190	17.1	1.7
12	0.998	5	86	44.7	1.4	13	0.265	118	199	43.2	+0.6
17	0.987	13	350	54.7	-1.5	18	0.491	91	204	63.8	-0.2
22	0.930	31	338	65.1	1.3	23	0.704	66	208	68.4	0.7
27	0.810	52	335	71.0	1.0	28	0.856	45	211	60.7	1.0
Apr. 1	0.633	75	333	67.0	-0.5	Oct. 3	0.943	28	215	49.6	1.1
6	0.440	97	333	54.2	+0.1	8	0.984	14	220	40.2	1.1
11	0.266	118	332	37.5	+0.8	13	0.998	4	240	33.5	-1.1
16	0.129	138	330	20.6	1.6	18	0.998	5	5	29.1	0.9
21	0.038	158	326	6.6	2.4	23	0.990	12	19	26.4	0.7
26	0.001	176	291	0.2	3.4	28	0.975	18	21	25.2	0.6
May 1	0.019	164	159	3.2	2.8	Nov. 2	0.956	24	21	25.0	0.4
6	0.078	148	154	11.7	+2.1	7	0.932	30	20	26.0	-0.4
11	0.158	133	152	20.3	1.6	12	0.898	37	17	28.2	0.3
16	0.246	121	152	26.6	1.2	17	0.853	45	15	31.8	0.3
21	0.335	109	153	30.9	0.9	22	0.790	55	12	37.2	0.3
26	0.425	99	154	34.5	0.6	27	0.697	67	8	44.5	0.2
31	0.519	88	156	38.5	+0.3	Dec. 2	0.560	83	5	51.9	-0.1
June 5	0.620	76	159	43.6	0.0	7	0.369	105	2	52.0	+0.3
10	0.732	62	163	50.6	-0.4	12	0.148	135	359	30.8	1.1
15	0.847	46	168	58.9	0.9	17	0.008	170	330	2.1	2.6
20	0.945	27	177	65.8	1.4	22	0.067	150	201	15.4	1.7
25	0.996	7	207	67.0	-1.8	27	0.258	119	195	42.0	+0.7
30	0.985	14	344	61.3	-1.6	32	0.451	96	192	48.8	+0.2

NOTATION.

k=the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.
i=the angle between the Sun and Earth, as seen from the planet.
 θ =the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.
L=the brilliancy of the disk. The unit of *L* is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

FOR GREENWICH MEAN NOON.

ate.	<i>k</i>	<i>i</i>	θ	<i>L</i>	Stellar Mag.	Date.	<i>k</i>	<i>i</i>	θ	<i>L</i>	Stellar Mag.
		°	°					°	°		
1	0.295	114.2	341.0	218.4	-4.4	July 5	0.791	54.4	168.1	70.2	-3.4
6	0.254	119.5	339.4	220.0	4.4	10	0.806	52.3	170.6	68.1	3.4
11	0.210	125.5	337.6	213.6	4.4	15	0.820	50.2	173.2	66.2	3.4
16	0.164	132.2	335.3	195.9	4.3	20	0.834	48.2	176.0	64.4	3.4
21	0.118	139.8	332.2	164.2	4.2	25	0.847	46.1	178.8	62.8	3.4
26	0.075	148.2	327.1	119.3	-4.0	30	0.859	44.1	181.7	61.4	-3.4
31	0.039	157.2	317.8	69.3	3.7	Aug. 4	0.871	42.1	184.7	60.0	3.4
5	0.016	165.5	296.2	30.1	3.4	9	0.883	40.0	187.6	58.8	3.3
10	0.010	168.7	247.1	18.4	3.3	14	0.894	38.0	190.4	57.6	3.3
15	0.021	163.2	206.5	39.0	3.5	19	0.904	36.0	193.2	56.6	3.3
20	0.048	154.6	190.0	81.4	-3.8	24	0.914	34.0	195.8	55.6	-3.3
25	0.086	145.8	182.1	127.9	4.0	29	0.924	32.0	198.2	54.8	3.3
2	0.130	137.8	177.3	165.9	4.2	Sept. 3	0.933	30.0	200.5	54.0	3.3
7	0.175	130.5	173.9	190.4	4.3	8	0.941	28.1	202.6	53.2	3.3
12	0.220	124.0	171.1	202.6	4.3	13	0.949	26.1	204.5	52.5	3.3
17	0.263	118.3	168.8	205.2	-4.3	18	0.956	24.1	206.1	51.9	-3.4
22	0.303	113.2	166.6	201.5	4.3	23	0.963	22.3	207.5	51.3	3.4
27	0.341	108.5	164.7	194.0	4.2	28	0.969	20.4	208.7	50.8	3.4
1	0.376	104.3	162.9	184.6	4.2	Oct. 3	0.974	18.5	209.7	50.2	3.4
6	0.409	100.4	161.3	174.4	4.2	8	0.979	16.6	210.4	49.8	3.4
11	0.440	96.9	159.8	164.0	-4.1	13	0.984	14.8	210.9	49.4	-3.4
16	0.469	93.5	158.6	154.0	4.0	18	0.987	12.9	211.2	49.0	3.4
21	0.496	90.4	157.5	144.6	4.0	23	0.991	11.1	211.3	48.7	3.4
26	0.522	87.4	156.6	135.8	4.0	28	0.993	9.3	211.3	48.4	3.4
1	0.547	84.6	155.9	127.7	3.9	Nov. 2	0.996	7.6	211.2	48.1	3.4
6	0.570	81.9	155.4	120.3	-3.8	7	0.997	5.8	211.2	47.9	-3.5
11	0.593	79.3	155.2	113.7	3.8	12	0.999	4.1	212.0	47.7	3.5
16	0.614	76.8	155.2	107.5	3.8	17	0.999	2.4	215.5	47.6	3.5
21	0.635	74.3	155.4	102.0	3.7	22	1.000	0.8	241.2	47.4	3.5
26	0.655	72.0	155.9	96.9	3.7	27	1.000	1.2	354.6	47.4	3.5
31	0.674	69.6	156.6	92.3	-3.6	Dec. 2	0.999	2.8	6.8	47.4	-3.5
5	0.692	67.4	157.6	88.2	3.6	7	0.998	4.5	8.1	47.4	3.5
10	0.710	65.1	158.8	84.4	3.6	12	0.997	6.1	7.1	47.5	3.4
15	0.728	62.9	160.2	81.0	3.5	17	0.995	7.7	5.3	47.6	3.4
20	0.744	60.8	161.8	77.9	3.5	22	0.993	9.4	3.1	47.8	3.4
25	0.760	58.6	163.7	75.1	-3.5	27	0.991	11.0	0.7	47.9	-3.4
30	0.776	56.5	165.8	72.6	-3.5	32	0.988	12.6	358.2	48.2	-3.4

NOTATION.

- k = the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.
- i = the angle between the Sun and Earth, as seen from the planet.
- θ = the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.
- L = the brilliancy of the disk. The unit of L is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

624

MARS, 1918.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

FOR GREENWICH MEAN NOON.

Date.	Light-Time.	Stellar Magni-tude.	P	$A_{\oplus}+180^{\circ}$	D_{\oplus}	$A_{\odot}-A_{\oplus}$	D_{\odot}	\odot_{δ}
	m		.	.	.	.	.	.
Jan. 1	9.44	+0.6	24.33	269.31	+22.73	-37.62	+19.24	54.18
3	9.28	0.6	24.63	269.98	22.67	37.38	19.46	55.06
5	9.13	0.5	24.91	270.62	22.62	37.12	19.68	55.93
7	8.97	0.5	25.17	271.23	22.56	36.83	19.88	56.81
9	8.82	0.4	25.42	271.80	22.49	36.50	20.09	57.68
11	8.66	+0.4	25.65	272.34	+22.43	-36.13	+20.29	58.56
13	8.51	0.4	25.86	272.84	22.36	35.72	20.48	59.43
15	8.36	0.3	26.05	273.31	22.30	35.28	20.67	60.31
17	8.21	0.3	26.23	273.74	22.23	34.79	20.86	61.18
19	8.06	0.2	26.39	274.12	22.16	34.26	21.04	62.06
21	7.92	+0.2	26.53	274.46	+22.10	-33.68	+21.22	62.93
23	7.77	0.2	26.65	274.76	22.04	33.06	21.39	63.80
25	7.63	+0.1	26.76	275.02	21.98	32.40	21.55	64.68
27	7.49	0.0	26.84	275.23	21.92	31.69	21.71	65.55
29	7.36	0.0	26.91	275.39	21.86	30.92	21.87	66.42
31	7.22	-0.1	26.95	275.50	+21.80	-30.11	+22.02	67.29
Feb. 2	7.09	0.1	26.98	275.57	21.76	29.24	22.16	68.17
4	6.96	0.2	26.98	275.57	21.71	28.32	22.30	69.04
6	6.84	0.2	26.96	275.53	21.66	27.34	22.44	69.91
8	6.72	0.3	26.93	275.43	21.63	26.30	22.57	70.79
10	6.61	-0.3	26.86	275.27	+21.59	-25.21	+22.69	71.66
12	6.50	0.4	26.78	275.06	21.56	24.06	22.81	72.54
14	6.39	0.4	26.67	274.80	21.54	22.86	22.92	73.41
16	6.29	0.5	26.54	274.47	21.52	21.59	23.03	74.28
18	6.19	0.6	26.39	274.10	21.51	20.27	23.13	75.16
20	6.10	-0.6	26.21	273.66	+21.50	-18.89	+23.23	76.03
22	6.01	0.7	26.01	273.18	21.49	17.46	23.32	76.91
24	5.93	0.7	25.79	272.64	21.49	15.97	23.40	77.78
26	5.86	0.8	25.55	272.06	21.50	14.44	23.48	78.66
28	5.79	0.8	25.28	271.42	21.50	12.85	23.56	79.54
Mar. 2	5.73	-0.8	24.99	270.75	+21.52	-11.22	+23.62	80.42
4	5.67	0.9	24.69	270.04	21.53	9.55	23.69	81.29
6	5.63	0.9	24.36	269.28	21.54	7.84	23.74	82.17
8	5.59	1.0	24.02	268.50	21.56	6.10	23.79	83.01
10	5.55	1.0	23.66	267.70	21.59	4.33	23.84	83.93
12	5.53	-1.0	23.29	266.87	+21.61	- 2.54	+23.88	84.82
14	5.51	1.1	22.91	266.03	21.63	- 0.73	23.91	85.70
16	5.50	1.1	22.52	265.19	21.66	+ 1.08	23.94	86.58
18	5.50	1.0	22.12	264.34	21.68	2.88	23.96	87.46
20	5.50	1.0	21.73	263.51	21.71	4.69	23.97	88.35
22	5.51	-1.0	21.34	262.68	+21.74	+ 6.48	+23.98	89.24
24	5.53	1.0	20.96	261.88	21.77	8.26	23.98	90.12
26	5.55	0.9	20.58	261.10	21.80	10.01	23.98	91.01
28	5.58	0.9	20.21	260.35	21.84	11.73	23.97	91.90
30	5.62	0.9	19.86	259.63	21.87	13.42	23.95	92.79
Apr. 1	5.67	-0.8	19.53	258.95	+21.91	+15.08	+23.93	93.68
3	5.72	-0.8	19.21	258.32	+21.95	+16.69	+23.90	94.58

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

FOR GREENWICH MEAN NOON.

Date.	k	Diameter.	i	q	Q	Central Meridian.	Mean Time of Transit of Zero Meridian.	
							Of Date.	Of Intermediate Date.
		"	"	"	"	"	h m	h m
1	0.909	8.89	35.20	0.81	292.84	123.82	16 10.1	16 48.8
3	0.910	9.04	34.94	0.81	292.77	104.97	17 27.5	18 6.2
5	0.911	9.20	34.66	0.82	292.68	86.15	18 44.8	19 23.3
7	0.913	9.36	34.35	0.82	292.59	67.37	20 1.8	20 40.4
9	0.914	9.52	34.01	0.81	292.49	48.61	21 18.8	21 57.2
11	0.916	9.69	33.64	0.81	292.38	29.89	22 35.6	23 14.0
13	0.918	9.86	33.23	0.81	292.27	11.21	23 52.3	. . . . .
15	0.920	10.04	32.79	0.80	292.14	352.57	0 30.5	1 8.7
17	0.923	10.22	32.32	0.79	292.01	333.96	1 46.9	2 25.0
19	0.926	10.41	31.80	0.78	291.87	315.40	3 3.1	3 41.2
21	0.928	10.60	31.26	0.77	291.72	296.87	4 19.2	4 57.1
23	0.930	10.80	30.66	0.76	291.56	278.39	5 35.0	6 12.9
25	0.933	11.00	30.03	0.74	291.39	259.96	6 50.7	7 28.4
27	0.936	11.20	29.36	0.72	291.20	241.56	8 6.2	8 43.8
29	0.939	11.41	28.65	0.70	291.00	223.22	9 21.4	9 59.0
31	0.942	11.62	27.89	0.68	290.79	204.92	10 36.4	11 13.9
2	0.945	11.83	27.08	0.65	290.56	186.68	11 51.3	12 28.6
4	0.948	12.05	26.22	0.62	290.31	168.48	13 5.9	13 43.1
6	0.952	12.27	25.32	0.59	290.04	150.34	14 20.2	14 57.4
8	0.956	12.49	24.36	0.56	289.74	132.26	15 34.4	16 11.4
10	0.959	12.70	23.35	0.52	289.40	114.22	16 48.3	17 25.2
12	0.963	12.92	22.29	0.48	289.03	96.25	18 2.0	18 38.7
14	0.966	13.14	21.18	0.44	288.61	78.32	19 15.4	19 52.0
16	0.970	13.35	20.02	0.40	288.14	60.45	20 28.6	21 5.1
18	0.973	13.56	18.81	0.36	287.60	42.64	21 41.6	22 18.0
20	0.977	13.76	17.54	0.32	286.98	24.88	22 54.3	23 30.6
22	0.980	13.96	16.23	0.28	286.26	7.17	. . . . .	0 6.8
24	0.983	14.15	14.88	0.24	285.39	349.51	0 43.0	1 19.2
26	0.986	14.33	13.48	0.20	284.34	331.90	1 55.2	2 31.2
28	0.989	14.49	12.04	0.16	283.04	314.33	3 7.2	3 43.2
2	0.992	14.65	10.57	0.12	281.36	296.80	4 19.1	4 54.9
4	0.994	14.79	9.08	0.09	279.12	279.31	5 30.8	6 6.6
6	0.996	14.91	7.56	0.06	275.98	261.86	6 42.3	7 18.0
8	0.997	15.02	6.05	0.04	271.25	244.43	7 53.7	8 29.4
10	0.998	15.11	4.59	0.02	263.44	227.03	9 5.0	9 40.7
12	0.999	15.18	3.26	0.01	248.70	209.65	10 16.3	10 51.9
14	0.999	15.23	2.38	0.01	219.25	192.28	11 27.5	12 3.1
16	0.999	15.26	2.48	0.01	179.22	174.91	12 38.7	13 14.3
18	0.999	15.27	3.49	0.01	153.21	157.54	13 49.9	14 25.5
20	0.998	15.26	4.87	0.03	140.23	140.16	15 1.1	15 36.8
22	0.997	15.23	6.38	0.05	133.12	122.76	16 12.5	16 48.2
24	0.995	15.18	7.93	0.07	128.72	105.35	17 23.9	17 59.6
26	0.993	15.11	9.47	0.10	125.75	87.90	18 35.4	19 11.3
28	0.991	15.03	11.01	0.14	123.60	70.43	19 47.1	20 23.0
30	0.988	14.93	12.53	0.18	121.97	52.92	20 59.0	21 35.0
1	0.985	14.81	14.02	0.22	120.69	35.37	22 11.0	22 47.1
3	0.982	14.68	15.48	0.27	119.64	17.78	23 23.2	23 59.4

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.
FOR GREENWICH MEAN NOON.

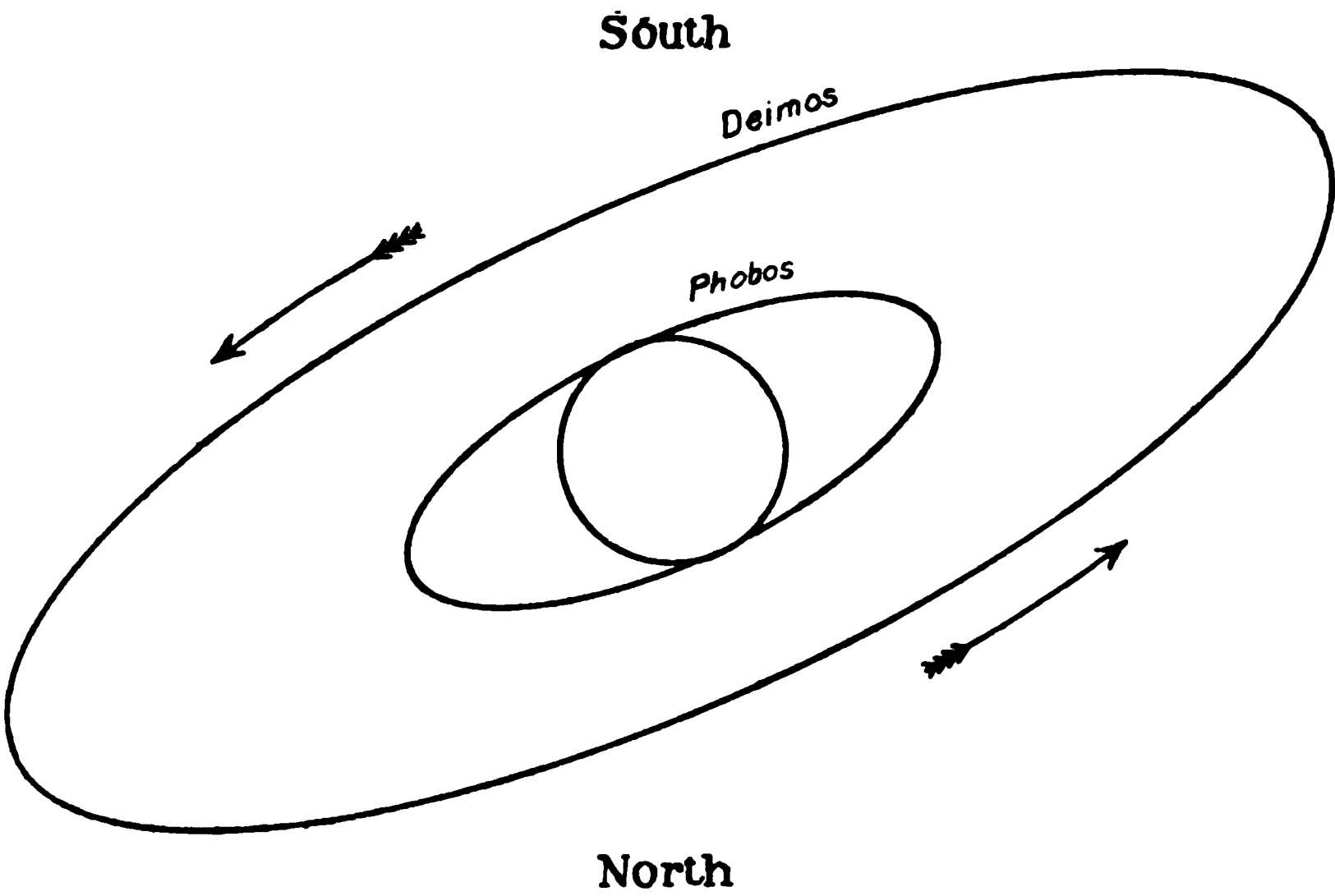
Date.	Light-Time.	Stellar Magni-tude.	<i>P</i>	$A_{\oplus}+180^{\circ}$	D_{\oplus}	$A_{\odot}-A_{\oplus}$	D_{\odot}	\odot_2
	m		.	.	.	.	.	.
Apr. 1	5.67	-0.8	19.53	258.95	+21.91	+15.08	+23.93	93.68
3	5.72	0.8	19.21	258.32	21.95	16.69	23.90	94.58
5	5.78	0.8	18.91	257.73	22.00	18.25	23.86	95.47
7	5.84	0.7	18.64	257.19	22.04	19.77	23.82	96.37
9	5.90	0.7	18.39	256.71	22.09	21.24	23.78	97.26
11	5.98	-0.6	18.17	256.27	+22.15	+22.65	+23.72	98.16
13	6.06	0.6	17.98	255.90	22.21	24.01	23.66	99.06
15	6.14	0.5	17.81	255.57	22.27	25.31	23.60	99.97
17	6.22	0.5	17.67	255.31	22.34	26.56	23.52	100.87
19	6.31	0.4	17.56	255.10	22.41	27.75	23.44	101.77
21	6.41	-0.4	17.48	254.95	+22.48	+28.88	+23.36	102.68
23	6.51	0.4	17.42	254.86	22.56	29.96	23.27	103.59
25	6.61	0.3	17.40	254.81	22.64	30.99	23.17	104.50
27	6.71	0.3	17.40	254.83	22.73	31.96	23.07	105.41
29	6.82	0.2	17.43	254.89	22.82	32.88	22.96	106.33
May 1	6.92	-0.2	17.49	255.01	+22.91	+33.75	+22.84	107.24
3	7.04	0.1	17.57	255.17	23.01	34.57	22.72	108.16
5	7.15	0.1	17.68	255.39	23.11	35.34	22.59	109.08
7	7.26	-0.1	17.81	255.65	23.21	36.07	22.45	110.00
9	7.38	0.0	17.96	255.96	23.31	36.75	22.31	110.92
11	7.50	0.0	18.14	256.32	+23.41	+37.38	+22.16	111.85
13	7.62	+0.1	18.34	256.71	23.52	37.97	22.01	112.78
15	7.74	0.1	18.55	257.15	23.62	38.52	21.85	113.71
17	7.86	0.1	18.79	257.64	23.72	39.02	21.68	114.64
19	7.98	0.2	19.05	258.16	23.82	39.49	21.51	115.57
21	8.10	+0.2	19.32	258.72	+23.92	+39.92	+21.33	116.51
23	8.23	0.3	19.62	259.31	24.02	40.31	21.14	117.45
25	8.35	0.3	19.92	259.94	24.12	40.67	20.95	118.39
27	8.48	0.3	20.24	260.60	24.22	41.00	20.75	119.34
29	8.60	0.4	20.58	261.29	24.31	41.29	20.55	120.28
31	8.73	+0.4	20.93	262.02	+24.40	+41.55	+20.34	121.23
June 2	8.85	0.4	21.29	262.77	24.48	41.78	20.12	122.18
4	8.98	0.4	21.66	263.56	24.56	41.99	19.90	123.14
6	9.10	0.5	22.04	264.36	24.63	42.17	19.67	124.09
8	9.22	0.5	22.43	265.20	24.70	42.32	19.43	125.06
10	9.35	+0.5	22.83	266.07	+24.76	+42.44	+19.19	126.01
12	9.48	0.6	23.24	266.96	24.82	42.54	18.95	126.98
14	9.60	0.6	23.65	267.87	24.87	42.61	18.69	127.95
16	9.72	0.6	24.07	268.81	24.91	42.66	18.43	128.92
18	9.84	0.7	24.50	269.77	24.95	42.68	18.17	129.89
20	9.97	+0.7	24.93	270.75	+24.97	+42.69	+17.90	130.86
22	10.09	0.7	25.36	271.75	24.99	42.68	17.62	131.84
24	10.21	0.7	25.80	272.76	25.00	42.64	17.34	132.83
26	10.33	0.8	26.23	273.80	25.01	42.59	17.06	133.81
28	10.45	0.8	26.67	274.86	25.00	42.52	16.76	134.80
30	10.57	+0.8	27.11	275.93	+24.98	+42.44	+16.46	135.79
July 2	10.69	+0.8	27.55	277.01	+24.96	+42.33	+16.16	136.78

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

FOR GREENWICH MEAN NOON.

							Mean Time of Transit of Zero Meridian.	
Date.		k	Diameter.	i	q	Q	Central Meridian.	
								Of Date.
								Of Intermedi- ate Date.
			"	°	"	°	°	h m
Or.	1	0.985	14.81	14.02	0.22	120.69	35.37	22 11.0
	3	0.982	14.68	15.48	0.27	119.64	17.78	23 23.2
	5	0.979	14.53	16.90	0.31	118.78	0.14	. . . . .
	7	0.975	14.38	18.28	0.36	118.05	342.44	1 12.0
	9	0.971	14.21	19.61	0.41	117.44	324.70	2 24.8
	11	0.967	14.04	20.90	0.46	116.89	306.90	3 37.8
	13	0.963	13.86	22.13	0.51	116.42	289.04	4 51.1
	15	0.959	13.67	23.32	0.56	116.01	271.13	6 4.6
	17	0.955	13.48	24.45	0.60	115.65	253.15	7 18.4
	19	0.951	13.29	25.54	0.65	115.33	235.12	8 32.4
	21	0.947	13.10	26.58	0.69	115.06	217.04	9 46.6
	23	0.944	12.90	27.56	0.73	114.81	198.89	11 1.1
	25	0.940	12.70	28.50	0.77	114.59	180.69	12 15.9
	27	0.936	12.51	29.39	0.80	114.40	162.44	13 30.8
	29	0.932	12.31	30.23	0.84	114.23	144.13	14 46.0
	1	0.928	12.12	31.03	0.87	114.08	125.77	16 1.5
	3	0.925	11.93	31.78	0.89	113.96	107.36	17 17.1
	5	0.922	11.74	32.50	0.92	113.84	88.91	18 33.0
	7	0.919	11.56	33.16	0.94	113.75	70.40	19 49.0
	9	0.916	11.37	33.80	0.96	113.67	51.85	21 5.3
ly	11	0.913	11.19	34.39	0.98	113.60	33.25	22 21.7
	13	0.910	11.02	34.94	0.99	113.54	14.60	23 38.4
	15	0.907	10.85	35.46	1.00	113.50	355.92	0 16.8
	17	0.905	10.68	35.94	1.02	113.46	337.19	1 33.7
	19	0.902	10.52	36.40	1.02	113.43	318.42	2 50.8
	21	0.900	10.36	36.82	1.03	113.41	299.62	4 8.0
	23	0.898	10.20	37.21	1.04	113.40	280.78	5 25.4
	25	0.896	10.05	37.57	1.04	113.39	261.91	6 43.0
	27	0.894	9.90	37.91	1.04	113.38	243.00	8 0.6
	29	0.893	9.76	38.22	1.05	113.38	224.06	9 18.5
ne	31	0.891	9.62	38.50	1.04	113.38	205.09	10 36.4
	2	0.890	9.48	38.76	1.04	113.39	186.08	11 54.5
	4	0.888	9.35	39.00	1.04	113.40	167.06	13 12.8
	6	0.887	9.22	39.22	1.04	113.40	148.00	14 31.1
	8	0.886	9.10	39.42	1.04	113.41	128.92	15 49.5
	10	0.885	8.98	39.59	1.03	113.42	109.80	17 8.1
	12	0.884	8.86	39.75	1.02	113.43	90.67	18 26.8
	14	0.884	8.74	39.89	1.02	113.44	71.51	19 45.6
	16	0.883	8.63	40.01	1.01	113.44	52.32	21 4.4
	18	0.882	8.52	40.11	1.00	113.44	33.12	22 23.4
	20	0.882	8.42	40.20	0.99	113.44	13.89	23 42.4
	22	0.882	8.32	40.27	0.99	113.44	354.65	0 22.0
	24	0.881	8.22	40.33	0.98	113.44	335.38	1 41.2
	26	0.881	8.12	40.37	0.97	113.43	316.10	3 0.4
	28	0.881	8.03	40.40	0.96	113.42	296.80	4 19.8
	30	0.881	7.94	40.43	0.95	113.40	277.49	5 39.2
	2	0.881	7.85	40.44	0.94	113.38	258.15	6 58.6
								7 38.4

APPARENT ORBITS OF THE SATELLITES OF MARS, AT DATE OF OPPOSITION, MARCH 14, 1918, AS SEEN IN AN INVERTING TELESCOPE.



Phobos.			Deimos.		
Date.	Position Angle of Apsls.	Apparent Distance at Apsls.	Date.	Position Angle of Apsls.	Apparent Distance at Apsls.
Feb. 13	299.0	16.7	Feb. 13	298.4	41.8
Mar. 15	294.8	19.5	Mar. 15	294.6	48.9
Apr. 14	289.7	17.6	Apr. 14	290.0	44.2

GREENWICH MEAN TIME OF GREATEST ELONGATION.

Phobos.			Deimos.		
d	h		d	h	
Feb. 19	23.0	E.	Feb. 17	17.7	E.
21	1.8	W.	19	15.1	W.
22	4.5	E.	21	12.5	E.
23	7.3	W.	23	9.9	W.
24	10.1	E.	25	7.3	E.
25	12.9	W.	27	4.7	W.
26	15.7	E.	Mar. 1	2.1	E.
27	18.4	W.	2	23.5	W.
28	21.2	E.	4	20.9	E.
Mar. 2	0.0	W.	6	18.3	W.
3	2.8	E.	8	15.6	E.
4	5.6	W.	10	13.0	W.
5	8.3	E.	12	10.4	E.
6	11.1	W.	14	7.8	W.
7	13.9	E.	16	5.2	E.
Mar. 8	16.7	W.	Mar. 18	2.6	W.
9	19.4	E.	19	23.9	E.
10	22.2	W.	21	21.3	W.
12	1.0	E.	23	18.7	E.
13	3.8	W.	25	16.1	W.
14	6.6	E.	27	13.5	E.
15	9.3	W.	29	10.9	W.
16	12.1	E.	31	8.3	E.
17	14.9	W.	Apr. 2	5.7	W.
18	17.7	E.	4	3.1	E.
19	20.5	W.	6	0.5	W.
20	23.2	E.	7	21.9	E.
22	2.0	W.	9	19.3	W.
23	4.8	E.	11	16.7	E.
24	7.6	W.	13	14.1	W.
Mar. 25	10.4	E.	Mar. 27	17.7	E.
26	13.1	W.	19	15.1	W.
27	15.9	E.	21	12.5	E.
28	18.7	W.	23	9.9	W.
29	21.5	E.	25	7.3	E.
31	0.2	W.	27	4.7	W.
Apr. 1	3.0	E.	Mar. 1	2.1	E.
2	5.8	W.	2	23.5	W.
3	8.6	E.	4	20.9	E.
4	11.4	W.	6	18.3	W.
5	14.2	E.	8	15.6	E.
6	16.9	W.	10	13.0	W.
7	19.7	E.	12	10.4	E.
8	22.5	W.	14	7.8	W.
10	1.3	E.	16	5.2	E.

For Phobos every seventh eastern and western elongation is given, and for Deimos every third; the intermediate ones may be found by adding multiples of the period of the satellite.
Sidereal period of Phobos, 7^h 39^m 13^s.85. Sidereal period of Deimos, 30^h 17^m 54^s.87.

PHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.

FOR GREENWICH MEAN NOON.

date.	Light-Time.	Stellar Magnitude.	P	$A_{\oplus}+180^{\circ}$	D_{\oplus}	$A_{\odot}+180^{\circ}$	D_{\odot}
	m		.	.	.	.	.
1	35.25	-2.3	348.59	286.82	+2.94	293.67	+2.81
8	35.88	2.2	348.38	286.32	2.91	294.28	2.80
15	36.60	2.2	348.24	285.98	2.88	294.90	2.78
22	37.39	2.2	348.16	285.79	2.85	295.51	2.77
29	38.24	2.1	348.16	285.78	2.82	296.12	2.76
5	39.13	-2.0	348.21	285.93	+2.79	296.74	+2.74
12	40.05	2.0	348.34	286.25	2.76	297.35	2.73
19	40.99	1.9	348.53	286.72	2.74	297.96	2.71
26	41.93	1.9	348.78	287.34	2.71	298.58	2.70
5	42.86	1.8	349.09	288.09	2.69	299.19	2.68
12	43.78	-1.8	349.45	288.96	+2.67	299.80	+2.66
19	44.66	1.7	349.86	289.96	2.65	300.41	2.65
26	45.52	1.7	350.32	291.05	2.63	301.02	2.63
2	46.33	1.7	350.82	292.23	2.61	301.63	2.61
9	47.08	1.6	351.36	293.50	2.59	302.24	2.60
16	47.79	-1.6	351.94	294.84	+2.57	302.84	+2.58
23	48.43	1.6	352.56	296.24	2.55	303.45	2.56
30	49.00	1.5	353.20	297.68	2.52	304.06	2.54
7	49.50	1.5	353.87	299.18	2.50	304.66	2.52
14	49.93	1.5	354.56	300.72	2.48	305.27	2.51
17	50.18	-1.5	1.29	315.25	+2.22	310.78	+2.32
24	49.81	1.5	2.00	316.78	2.18	311.38	2.30
31	49.36	1.5	2.69	318.26	2.15	311.98	2.28
7	48.84	1.5	3.36	319.70	2.11	312.58	2.26
14	48.26	-1.6	4.00	321.08	+2.08	313.18	+2.24
21	47.62	1.6	4.61	322.40	2.04	313.77	2.22
28	46.92	1.6	5.18	323.65	2.01	314.37	2.20
4	46.17	1.6	5.72	324.82	1.98	314.97	2.17
11	45.37	1.7	6.21	325.90	1.94	315.56	2.15
18	44.53	-1.7	6.65	326.88	+1.91	316.16	+2.13
25	43.67	1.8	7.04	327.75	1.88	316.75	2.10
2	42.79	1.8	7.38	328.51	1.86	317.34	2.08
9	41.89	1.9	7.66	329.13	1.83	317.94	2.06
16	41.01	1.9	7.87	329.61	1.81	318.53	2.03
23	40.12	-2.0	8.01	329.94	+1.79	319.12	+2.01
30	39.26	2.0	8.09	330.11	1.78	319.71	1.98
6	38.45	2.0	8.10	330.13	1.76	320.30	1.96
13	37.68	2.1	8.03	329.98	1.75	320.90	1.94
20	36.98	2.1	7.89	329.66	1.75	321.49	1.91
27	36.36	-2.2	7.69	329.20	+1.74	322.08	+1.89
4	35.84	2.2	7.42	328.59	1.74	322.66	1.86
11	35.42	2.2	7.09	327.85	1.74	323.25	1.84
18	35.11	2.2	6.72	327.02	1.74	323.84	1.81
25	34.93	2.2	6.32	326.12	1.75	324.42	1.79
32	34.87	-2.3	5.89	325.18	+1.75	325.01	+1.76

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.
FOR GREENWICH MEAN NOON.

Date.		Equa- torial Diameter.	Excess of Equat. Diameter over Polar.	l	g	Q	Central Meridian.		Correction for Phas.
							System I.	System II.	
		"	"	°	"	°	°	°	°
Jan.	1	47.24	2.86	6.83	0.17	77.73	15.16	270.10	-0.20
	8	46.41	2.81	7.95	0.22	77.80	40.57	242.11	0.28
	15	45.49	2.75	8.91	0.28	77.87	65.78	213.91	0.35
	22	44.54	2.69	9.71	0.32	77.95	90.78	185.50	0.41
	29	43.55	2.64	10.33	0.35	78.07	115.58	156.90	0.46
Feb.	5	42.56	2.58	10.79	0.38	78.22	140.18	128.09	-0.51
	12	41.58	2.52	11.09	0.39	78.42	164.61	99.11	0.54
	19	40.63	2.46	11.23	0.39	78.67	188.86	69.96	0.55
	26	39.71	2.40	11.22	0.38	78.96	212.98	40.67	0.55
Mar.	5	38.85	2.35	11.08	0.36	79.29	236.96	11.24	0.53
	12	38.04	2.30	10.82	0.34	79.68	260.82	341.70	-0.51
	19	37.28	2.26	10.44	0.31	80.10	284.59	312.06	0.47
	26	36.58	2.22	9.96	0.27	80.57	308.27	282.35	0.43
Apr.	2	35.94	2.18	9.38	0.24	81.08	331.90	252.56	0.38
	9	35.37	2.14	8.73	0.20	81.63	355.47	222.73	0.33
	16	34.85	2.11	8.00	0.17	82.21	19.00	192.86	-0.28
	23	34.39	2.08	7.21	0.14	82.84	42.51	162.96	0.23
	30	33.99	2.06	6.36	0.10	83.51	66.01	133.06	0.18
May	7	33.64	2.04	5.47	0.08	84.24	89.51	103.15	0.13
	14	33.35	2.02	4.54	0.05	85.01	113.01	73.24	0.09
	
July	17	33.19	2.01	4.47	0.05	269.81	123.93	315.84	+0.09
	24	33.43	2.02	5.39	0.07	270.62	147.93	286.43	0.13
	31	33.74	2.04	6.27	0.10	271.36	172.02	257.11	0.17
Aug.	7	34.09	2.06	7.11	0.13	272.03	196.20	227.87	0.22
	14	34.50	2.09	7.90	0.17	272.68	220.47	198.73	+0.27
	21	34.97	2.12	8.62	0.20	273.30	244.84	169.69	0.32
	28	35.49	2.15	9.28	0.23	273.88	269.32	140.75	0.37
Sept.	4	36.07	2.19	9.85	0.27	274.40	293.91	111.92	0.42
	11	36.70	2.23	10.33	0.30	274.88	318.61	83.22	0.46
	18	37.39	2.27	10.72	0.33	275.32	343.44	54.63	+0.50
	25	38.13	2.31	11.00	0.35	275.71	8.39	26.17	0.53
Oct.	2	38.92	2.36	11.16	0.37	276.04	33.48	357.84	0.54
	9	39.75	2.41	11.19	0.38	276.32	58.70	329.65	0.54
	16	40.61	2.46	11.07	0.38	276.53	84.07	301.59	0.53
	23	41.51	2.52	10.81	0.37	276.68	109.57	273.69	+0.51
	30	42.41	2.57	10.40	0.35	276.77	135.22	245.92	0.47
Nov.	6	43.31	2.63	9.82	0.32	276.78	161.01	218.29	0.42
	13	44.19	2.68	9.08	0.28	276.72	186.92	190.80	0.36
	20	45.03	2.73	8.18	0.23	276.60	212.96	163.42	0.29
	27	45.79	2.78	7.12	0.17	276.40	239.10	136.15	+0.22
Dec.	4	46.46	2.82	5.92	0.12	276.15	265.34	108.97	0.15
	11	47.02	2.85	4.60	0.08	275.83	291.63	81.85	0.09
	18	47.43	2.87	3.18	0.04	275.44	317.94	54.76	0.04
	25	47.68	2.89	1.69	0.01	274.93	344.26	27.66	+0.01
	32	47.76	2.89	0.16	0.00	272.42	10.54	0.52	0.00

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER,
SYSTEM I.

GREENWICH MEAN TIME.

Transit of Zero Meridian.	Interval between Successive Transits.	Transit of Zero Meridian.	Interval between Successive Transits.	Transit of Zero Meridian.	Interval between Successive Transits.
d h m	h m	Apr. d h m	h m	Sept. d h m	h m
1 9 25.96	9 50.50	18 0 42.61	9 50.67	18 20 7.42	9 50.53
3 10 38.41		20 1 55.95		20 21 20.08	
5 11 50.89		22 3 9.28		22 22 32.73	
7 13 3.39		24 4 22.62		24 23 45.37	
9 14 15.93		26 5 35.96		27 0 57.98	
11 15 28.50	9 50.53	28 6 49.30	9 50.67	29 2 10.58	9 50.51
13 16 41.09		30 8 2.65		1 3 23.16	
15 17 53.71		2 9 15.99		3 4 35.73	
17 19 6.36		4 10 29.34		5 5 48.28	
19 20 19.04		6 11 42.69		7 7 0.81	
21 21 31.75	9 50.55	8 12 56.03	9 50.67	9 8 13.32	9 50.49
23 22 44.49		10 14 9.37		11 9 25.81	
25 23 57.25		12 15 22.71		13 10 38.29	
28 1 10.03		14 16 36.06		15 11 50.74	
30 2 22.85		16 17 49.40		17 13 3.18	
1 3 35.69	9 50.57	18 19 2.74	9 50.67	19 14 15.60	9 50.48
3 4 48.55		20 20 16.07		21 15 28.01	
5 6 1.44		22 21 29.41		23 16 40.39	
7 7 14.35		24 22 42.74		25 17 52.76	
9 8 27.28		26 23 56.07		27 19 5.11	
11 9 40.24	9 50.60	.. .. .		29 20 17.44	9 50.46
13 10 53.22		July 17 6 27.16	9 50.62	31 21 29.75	
15 12 6.22		19 7 40.28		2 22 42.05	
17 13 19.24		21 8 53.39		4 23 54.33	
19 14 32.27		23 10 6.48		7 1 6.60	
21 15 45.33	9 50.62	25 11 19.56	9 50.61	9 2 18.84	9 50.44
23 16 58.40		27 12 32.62		11 3 31.07	
25 18 11.49		29 13 45.68		13 4 43.28	
27 19 24.59		31 14 58.72		15 5 55.47	
1 20 37.72		Aug. 2 16 11.75		17 7 7.65	
3 21 50.86	9 50.63	4 17 24.76	9 50.60	19 8 19.82	9 50.43
5 23 4.01		6 18 37.76		21 9 31.97	
8 0 17.18		8 19 50.75		23 10 44.10	
10 1 30.36		10 21 3.73		25 11 56.23	
12 2 43.56		12 22 16.69		27 13 8.33	
14 3 56.76	9 50.64	14 23 29.63	9 50.58	29 14 20.43	9 50.42
16 5 9.98		17 0 42.56		1 15 32.52	
18 6 23.21		19 1 55.48		3 16 44.59	
20 7 36.45		21 3 8.38		5 17 56.65	
22 8 49.70		23 4 21.27		7 19 8.71	
24 10 2.96	9 50.65	25 5 34.14	9 50.57	9 20 20.76	9 50.41
26 11 16.23		27 6 47.00		11 21 32.79	
28 12 29.51		29 7 59.85		13 22 44.84	
30 13 42.79		31 9 12.68		15 23 56.87	
1 14 56.08		Sept. 2 10 25.49		18 1 8.89	
3 16 9.38	9 50.66	4 11 38.29	9 50.55	20 2 20.93	9 50.40
5 17 22.68		6 12 51.07		22 3 32.96	
7 18 35.99		8 14 3.83		24 4 44.98	
9 19 49.31		10 15 16.58		26 5 57.01	
11 21 2.63		12 16 29.32		28 7 9.05	
13 22 15.95	9 50.67	14 17 42.03	9 50.54	30 8 21.09	9 50.41
15 23 29.28		16 18 54.73		32 9 33.13	

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER,
SYSTEM II.

GREENWICH MEAN TIME.

Transit of Zero Meridian.				Interval between Successive Transits.	Transit of Zero Meridian.				Interval between Successive Transits.	Transit of Zero Meridian.				Interval between Successive Transits.	
				h m					h m					h m	
Jan.	d	h	m	9 55.67	Apr.	d	h	m	9 55.85	Sept.	d	h	m	9 55.	
	1	2	29.09			18	16	12.18			19	4	15.92		
	3	4	7.42			20	17	51.41			21	5	54.47		
	5	5	45.78			22	19	30.65			23	7	33.01		
	7	7	24.17			24	21	9.89			25	9	11.53		
	9	9	2.58			26	22	49.13			27	10	50.03		
	11	10	41.03	9 55.70	May	29	0	28.37	9 55.85	Oct.	29	12	28.52	9 55.	
	13	12	19.51			1	2	7.61			1	14	6.99		
	15	13	58.02			3	3	46.86			3	15	45.44		
	17	15	36.55			5	5	26.10			5	17	23.87		
	19	17	15.12			7	7	5.35			7	19	2.28		
	21	18	53.71	9 55.73		9	8	44.59	9 55.85		9	20	40.68	9 55.	
	23	20	32.33			11	10	23.83			11	22	19.05		
	25	22	10.98			13	12	3.08			13	23	57.41		
	27	23	49.65			15	13	42.32			16	1	35.74		
	30	1	28.36			17	15	21.56			18	3	14.07		
Feb.	1	3	7.09	9 55.75		19	17	0.80	9 55.85		20	4	52.38	9 55.	
	3	4	45.84			21	18	40.03			22	6	30.66		
	5	6	24.62			23	20	19.26			24	8	8.93		
	7	8	3.42			25	21	58.49			26	9	47.17		
	9	9	42.24			27	23	37.72			28	11	25.40		
	11	11	21.09	9 55.77	July	17	1	12.95	9 55.80	Nov.	30	13	3.61	9 55.	
	13	12	59.96			19	2	51.96			1	14	41.80		
	15	14	38.85			21	4	30.97			3	16	19.97		
	17	16	17.76			23	6	9.96			5	17	58.13		
	19	17	56.69			25	7	48.94			9 55.79		7		19	36.27
	21	19	35.64	9 55.79		27	9	27.90	9	21			14.39	9 55.	
	23	21	14.61			29	11	6.85	11	22			52.50		
	25	22	53.60			31	12	45.79	14	0			30.59		
	28	0	32.60			2	14	24.71	16	2			8.65		
	2	2	11.62		Aug.	4	16	3.63	9 55.78		18	3	46.71		
Mar.	4	3	50.66	9 55.81		6	17	42.52			20	5	24.75	9 55.	
	6	5	29.71			8	19	21.41			22	7	2.78		
	8	7	8.77			10	21	0.28			24	8	40.79		
	10	8	47.85			12	22	39.13			26	10	18.79		
	12	10	26.94			15	0	17.97	9 55.76		28	11	56.77		
	14	12	6.04	9 55.82		17	1	56.80	Dec.	30	13	34.74	9 55.		
	16	13	45.16			19	3	35.61		2	15	12.70			
	18	15	24.29			21	5	14.41		4	16	50.65			
	20	17	3.43			23	6	53.19		6	18	28.59			
	22	18	42.58			25	8	31.96		9 55.75		8		20	6.52
	24	20	21.74	9 55.83	Sept.	27	10	10.71				10	21	44.44	9 55.
	26	22	0.90			29	11	49.45				12	23	22.35	
	28	23	40.08			31	13	28.17				15	1	0.27	
	31	1	19.27			2	15	6.87				17	2	38.18	
	2	2	58.45			4	16	45.56		9 55.73		19	4	16.08	
Apr.	4	4	37.65	9 55.84		6	18	24.23				21	5	53.99	9 55.
	6	6	16.85			8	20	2.89				23	7	31.89	
	8	7	56.06			10	21	41.53				25	9	9.80	
	10	9	35.28			12	23	20.15				27	10	47.71	
	12	11	14.50			15	0	58.75		9 55.71		29	12	25.63	
	14	12	53.72	9 55.85		17	2	37.34				31	14	3.55	9 55.
	16	14	32.95								33	15	41.47		

A diagram illustrating the motion of a charged particle in a uniform magnetic field. The magnetic field is represented by two parallel arrows pointing to the right, labeled B . A particle, represented by a small circle with a cross, moves in a helical path around a central axis. The path consists of a series of concentric loops (cyclotron motion) and a forward progression along the axis (drift motion).

PPARENT ORBITS OF THE SATELLITES OF JUPITER AT DATE OF OPPOSITION, JANUARY 1, 1919, AS SEEN IN AN INVERTING TELESCOPE, AND ELONGATED IN THE RATIO OF THREE TO ONE IN THE DIRECTION OF THEIR MINOR AXES.

In the diagrams of the configurations of Jupiter's four brighter satellites, pages 639-659, Jupiter is represented by a light disk, ○, in the center of the page, and the relative positions of the satellites at the Greenwich time stated above the diagrams are indicated by dots. The designation of each satellite is shown by a numeral placed to the right or left of the dot, according to the motion of the satellite at the instant in question is toward the east or toward the west, the motion being always toward the numeral. In constructing the diagrams the latitudes of the satellites are always considered zero, except where two or more of them chance to be at nearly the same distance from the planet, when they are placed one above the other, according to their apparent latitudes. If, at the epoch of any configuration, one or more satellites are projected on the disk of the planet, that phenomenon is indicated by a light disk, ○, at the left-hand side of the page; and if any satellites are invisible on account of being occulted behind the disk of the planet, or eclipsed by its shadow, that circumstance is indicated by a dark disk, ●, at the right-hand side of the page. In both cases the annexed numerals serve to point out which satellites are thus rendered invisible.

	d	h	m	s	d		d	h	m	s	d
I.	1	18	28	35.946	-	1.769	860	49			
II.	3	13	17	53.736	-	3.554	094	17			
III.	7	3	59	35.856	-	7.166	387	22			
IV.	16	18	5	6.916	-	16.753	552	27			

	d	h	m	s	d
V.	0	11	57	27.635	- 0.498 236 52
VI.					-266.00
VII.					-276.67

SATELLITE V.

GREENWICH MEAN TIME OF EVERY TWENTIETH GREATEST ELONGATION.

Jan.	d	h	E.	Oct.	d	h	E.	Jan.	d	h	W.	Oct.	d	h	W.
	1	15.3	E.		11	16.0	E.		1	21.3	W.		11	22.0	W.
	11	14.5	E.		21	15.1	E.		11	20.4	W.		21	21.1	W.
	21	13.6	E.		31	14.3	E.		21	19.6	W.		31	20.2	W.
	31	12.7	E.	Nov.	10	13.4	E.		31	18.7	W.	Nov.	10	19.4	W.
Feb.	10	11.9	E.		20	12.4	E.	Feb.	10	17.9	W.		20	18.4	W.
	20	11.1	E.		30	11.5	E.		20	17.0	W.		30	17.5	W.
Mar.	2	10.2	E.	Dec.	10	10.6	E.	Mar.	2	16.2	W.	Dec.	10	16.6	W.
					20	9.7	E.						20	15.7	W.
Oct.	1	16.9	E.		30	8.8	E.	Oct.	1	22.9	W.		30	14.8	W.

GREENWICH MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

SATELLITE I.

Jan.	d	h	m	Mar.	d	h	m	July	d	h	m	Oct.	d	h	m
	1	12	21.9		22	3	40.1		25	21	27.0		13	13	23.0
	3	6	48.6		23	22	9.9		27	15	57.0		15	7	51.1
	5	1	15.5		25	16	39.6		29	10	27.0		17	2	19.2
	6	19	42.3		27	11	9.5		31	4	56.9		18	20	47.1
	8	14	9.4		29	5	39.4	Aug.	1	23	26.9		20	15	15.1
	10	8	36.5		31	0	9.3		3	17	56.8		22	9	42.9
	12	3	3.7	Apr.	1	18	39.2		5	12	26.7		24	4	10.7
	13	21	30.9		3	13	9.2		7	6	56.6		25	22	38.4
	15	15	58.3		5	7	39.2		9	1	26.4		27	17	6.1
	17	10	25.7		7	2	9.3		10	19	56.2		29	11	33.6
	19	4	53.2		8	20	39.3		12	14	26.0		31	6	1.2
	20	23	20.7		10	15	9.4		14	8	55.8	Nov.	2	0	28.6
	22	17	48.4		12	9	39.5		16	3	25.5		3	18	56.0
	24	12	16.1		14	4	9.7		17	21	55.2		5	13	23.2
	26	6	44.0		15	22	39.8		19	16	24.8		7	7	50.5
	28	1	11.8		17	17	10.0		21	10	54.5		9	2	17.6
	29	19	39.8		19	11	40.2		23	5	24.0		10	20	44.7
	31	14	7.8		21	6	10.5		24	23	53.6		12	15	11.7
Feb.	2	8	36.0		23	0	40.7		26	18	23.1		14	9	38.7
	4	3	4.1		24	19	11.0		28	12	52.6		16	4	5.6
	5	21	32.4		26	13	41.2		30	7	22.1		17	22	32.4
	7	16	0.8		28	8	11.5	Sept.	1	1	51.5		19	16	59.1
	9	10	29.2		30	2	41.8		2	20	20.8		21	11	25.9
	11	4	57.7	May	1	21	12.1		4	14	50.2		23	5	52.5
	12	23	26.3		3	15	42.4		6	9	19.4		25	0	19.1
	14	17	54.9		5	10	12.8		8	3	48.7		26	18	45.6
	16	12	23.6		7	4	43.1		9	22	17.9		28	13	12.1
	18	6	52.3		8	23	13.5		11	16	47.0		30	7	38.4
	20	1	21.2		10	17	43.9		13	11	16.0	Dec.	2	2	4.8
	21	19	50.1		12	12	14.3		15	5	45.2		3	20	31.0
	23	14	19.1		14	6	44.6		17	0	14.2		5	14	57.3
	25	8	48.1		16	1	15.0		18	18	43.2		7	9	23.5
	27	3	17.2		17	19	45.4		20	13	12.1		9	3	49.7
	28	21	46.3		19	14	15.8		22	7	41.0		10	22	15.7
Mar.	2	16	15.6		..	..	..		24	2	9.8		12	16	41.9
	4	10	44.8		..	..	..		25	20	38.6		14	11	7.9
	6	5	14.1		..	..	..		27	15	7.2		16	5	33.9
	7	23	43.4	July	11	17	26.1		29	9	35.9		17	23	59.9
	9	18	12.9		13	11	56.2	Oct.	1	4	4.5		19	18	25.9
	11	12	42.3		15	6	26.4		2	22	33.0		21	12	51.8
	13	7	11.9		17	0	56.6		4	17	1.5		23	7	17.8
	15	1	41.4		18	19	26.7		6	11	29.9		25	1	43.6
	16	20	11.0		20	13	56.8		8	5	58.3		26	20	9.6
	18	14	40.6		22	8	26.8		10	0	26.6		28	14	35.5
20	9	10.4			24	2	56.9		11	18	54.8		30	9	1.4

GREENWICH MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

SATELLITE II.											
n.	d	h	m	Mar.	d	h	m	July	d	h	m
	2	10	34.8		25	3	48.3		24	4	4.2
	5	23	44.5		28	17	10.5		27	17	28.9
	9	12	54.9	Apr.	1	6	33.2		31	6	54.3
	13	2	5.8		4	19	56.0	Aug.	3	20	18.5
	16	15	17.4		8	9	19.4		7	9	43.5
	20	4	29.5		11	22	42.8		10	23	7.3
	23	17	42.4		15	12	6.8		14	12	31.8
	27	6	55.8		19	1	30.8		18	1	55.1
	30	20	9.9		22	14	55.3		21	15	18.9
b.	3	9	24.6		26	4	19.7		25	4	41.7
	6	22	39.9		29	17	44.7		28	18	4.8
	10	11	55.8	May	3	7	9.5	Sept.	1	7	26.9
	14	1	12.3		6	20	34.9		4	20	49.3
	17	14	29.4		10	10	0.0		8	10	10.7
	21	3	47.1		13	23	25.8		11	23	32.3
	24	17	5.3		17	12	51.1		15	12	52.9
	28	6	24.0		..	..	...		19	2	13.6
nr.	3	19	43.3		..	..	...		22	15	33.3
	7	9	3.0		..	..	...		26	4	53.0
	10	22	23.2		..	..	...		29	18	11.7
	14	11	43.8	July	13	11	47.3	Oct.	3	7	30.4
	18	1	4.9		17	1	13.4		6	20	48.2
	21	14	26.4		20	14	38.4		10	10	5.8

SATELLITE III.											
n.	d	h	m	Apr.	d	h	m	July	d	h	m
	6	2	27.6		2	1	55.5		18	20	45.1
	13	5	59.8		9	6	16.1		26	1	12.2
	20	9	37.1		16	10	39.4	Aug.	2	5	37.2
	27	13	18.8		23	15	3.8		9	10	0.6
b.	3	17	5.5		30	19	29.8		16	14	21.8
	10	20	57.4	May	7	23	56.3		23	18	41.1
	18	0	54.2		15	4	23.9		30	22	58.6
	25	4	56.1		..	..	...	Sept.	7	3	13.7
nr.	4	9	1.5		..	..	...		14	7	26.5
	11	13	10.7		..	..	...		21	11	35.4
	18	17	22.6		..	..	...		28	15	40.6
	25	21	37.6	July	11	16	17.6	Oct.	5	19	41.7

SATELLITE IV.											
n.	d	h	m	Apr.	d	h	m	July	d	h	m
	10	3	34.1		3	21	35.8		30	22	18.7
	26	19	39.1		20	17	45.9		16	18	37.4
b.	12	12	48.6	May	7	14	18.1	Sept.	2	14	29.9
nr.	1	6	56.7		..	..	...		19	9	47.2
	18	1	55.8	July	14	1	41.5	Oct.	6	4	21.5

DIFFERENTIAL COORDINATES OF SATELLITE VI.
FOR GREENWICH MEAN NOON.

Date.	$\alpha_{VI}-\alpha_{Jup.}$		$\delta_{VI}-\delta_{Jup.}$	Date.	$\alpha_{VI}-\alpha_{Jup.}$		$\delta_{VI}-\delta_{Jup.}$	Date.	$\alpha_{VI}-\alpha_{Jup.}$		$\delta_{VI}-\delta_{Jup.}$
	m	s	'		m	s	'		m	s	'
Jan. 0	-1	44	+19.0	Apr. 14	+0	9	-24.7	Sept. 21	-0	34	+15.1
2	1	58	17.7	16	0	15	24.5	23	0	47	14.5
4	2	10	16.3	18	0	22	24.2	25	0	59	13.8
6	2	22	14.8	20	0	28	24.0	27	1	11	13.0
8	2	34	13.3	22	0	35	23.7	29	1	23	12.2
10	-2	44	+11.8	24	+0	41	-23.3	Oct. 1	-1	34	+11.3
12	2	53	10.2	26	0	47	23.0	3	1	46	10.4
14	3	1	8.5	28	0	53	22.6	5	1	57	9.4
16	3	8	6.9	30	0	59	22.2	7	2	8	8.4
18	3	14	5.2	May 2	1	5	21.8	9	2	19	7.3
20	-3	19	+ 3.6	4	+1	11	-21.4	11	-2	29	+ 6.2
22	3	23	1.9	6	1	16	20.9	13	2	39	5.0
24	3	27	+ 0.3	8	1	22	20.4	15	2	48	3.8
26	3	29	- 1.3	10	1	27	20.0	17	2	57	2.6
28	3	30	2.9	12	1	32	19.4	19	3	6	1.4
30	-3	31	- 4.4	14	+1	38	-18.9	21	-3	14	+ 0.2
Feb. 1	3	31	5.9	16	+1	43	-18.4	23	3	22	- 1.0
3	3	30	7.3	..	.	..	...	25	3	29	2.3
5	3	28	8.7	July ..	.	..	...	27	3	35	3.5
7	3	26	10.0	17	+3	8	+ 4.0	29	3	41	4.8
9	-3	23	-11.2	19	+3	8	+ 4.8	Nov. 31	-3	47	- 6.0
11	3	20	12.4	21	3	7	5.6	2	3	52	7.2
13	3	16	13.6	23	3	6	6.4	4	3	56	8.5
15	3	11	14.7	25	3	4	7.2	6	4	0	9.7
17	3	6	15.7	27	3	3	8.0	8	4	2	10.9
19	-3	1	-16.6	29	+3	1	+ 8.8	10	-4	5	-12.2
21	2	56	17.5	31	2	58	9.6	12	4	7	13.4
23	2	50	18.3	Aug. 2	2	55	10.3	14	4	8	14.6
25	2	44	19.1	4	2	52	11.0	16	4	8	15.7
27	2	37	19.8	6	2	48	11.8	18	4	8	16.9
Mar. 1	-2	31	-20.5	8	+2	44	+12.4	20	-4	7	-18.0
3	2	24	21.1	10	2	40	13.1	22	4	6	19.2
5	2	17	21.6	12	2	35	13.7	24	4	4	20.3
7	2	10	22.2	14	2	29	14.3	26	4	1	21.3
9	2	2	22.6	16	2	23	14.8	28	3	57	22.4
11	-1	55	-23.1	18	+2	17	+15.4	Dec. 30	-3	53	-23.4
13	1	48	23.5	20	2	10	15.8	2	3	48	24.4
15	1	40	23.8	22	2	2	16.2	4	3	43	25.3
17	1	32	24.1	24	1	54	16.6	6	3	37	26.2
19	1	25	24.4	26	1	46	16.9	8	3	31	27.1
21	-1	18	-24.6	28	+1	37	+17.2	10	-3	23	-27.9
23	1	10	24.8	30	1	28	17.4	12	3	16	28.7
25	1	3	25.0	Sept. 1	1	19	17.5	14	3	7	29.4
27	0	55	25.1	3	1	9	17.6	16	2	59	30.0
29	0	48	25.2	5	0	58	17.6	18	2	49	30.6
31	-0	40	-25.2	7	+0	48	+17.5	20	-2	40	-31.2
Apr. 2	0	33	25.3	9	0	36	17.4	22	2	29	31.6
4	0	26	25.2	11	0	25	17.2	24	2	19	32.0
6	0	19	25.2	13	0	14	16.9	26	2	8	32.3
8	0	12	25.1	15	+0	2	16.6	28	1	57	32.5
10	-0	5	-25.0	17	-0	10	+16.2	30	-1	45	-32.6
12	+0	2	-24.8	19	-0	22	+15.7	32	-1	34	-32.7

DIFFERENTIAL COORDINATES OF SATELLITE VII.
FOR GREENWICH MEAN NOON.

Date.	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$	Date.	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$	Date.	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$
	m s	'		m s	'		m s	'
0	+0 28	- 9.0	Apr. 14	-0 21	+11.6	Sept. 21	-1 32	- 8.1
2	0 42	9.6	16	0 28	12.2	23	1 22	9.3
4	0 55	10.1	18	0 35	12.8	25	1 11	10.4
6	1 9	10.6	20	0 41	13.4	27	1 1	11.6
8	1 21	11.1	22	0 48	13.9	29	0 50	12.7
10	+1 34	-11.5	24	-0 54	+14.5	Oct. 1	-0 39	-13.8
12	1 45	11.8	26	1 0	15.0	3	0 27	14.8
14	1 56	12.1	28	1 6	15.5	5	0 15	15.8
16	2 6	12.4	30	1 13	16.0	7	-0 3	16.7
18	2 16	12.6	May 2	1 19	16.5	9	+0 9	17.6
20	+2 24	-12.7	4	-1 24	+17.0	11	+0 22	-18.4
22	2 32	12.8	6	1 30	17.5	13	0 34	19.1
24	2 40	12.8	8	1 36	17.9	15	0 47	19.8
26	2 46	12.8	10	1 41	18.4	17	0 59	20.4
28	2 51	12.7	12	1 46	18.8	19	1 12	20.9
30	+2 56	-12.6	14	-1 52	+19.2	21	+1 24	-21.3
1	2 59	12.4	16	-1 57	+19.6	23	1 37	21.6
3	3 2	12.1	..	. ..	...	25	1 49	21.8
5	3 4	11.8	..	. ..	...	27	2 1	21.9
7	3 5	11.5	July 17	-3 27	+19.9	29	2 12	21.9
9	+3 5	-11.0	19	-3 28	+19.6	31	+2 23	-21.8
11	3 4	10.6	21	3 28	19.2	Nov. 2	2 34	21.5
13	3 2	10.1	23	3 28	18.8	4	2 44	21.2
15	3 0	9.5	25	3 29	18.4	6	2 53	20.7
17	2 57	8.9	27	3 29	17.9	8	3 2	20.1
19	+2 53	- 8.3	29	-3 28	+17.4	10	+3 10	-19.4
21	2 49	7.6	31	3 28	16.9	12	3 17	18.6
23	2 44	6.9	Aug. 2	3 28	16.3	14	3 23	17.7
25	2 38	6.2	4	3 27	15.7	16	3 29	16.7
27	2 32	5.5	6	3 26	15.1	18	3 34	15.6
1	+2 26	- 4.7	8	-3 25	+14.4	20	+3 38	-14.4
3	2 19	3.9	10	3 23	13.7	22	3 41	13.1
5	2 12	3.1	12	3 22	13.0	24	3 43	11.8
7	2 4	2.3	14	3 20	12.2	26	3 45	10.4
9	1 57	1.5	16	3 17	11.4	28	3 45	8.9
11	+1 49	- 0.7	18	-3 15	+10.6	30	+3 45	- 7.4
13	1 41	+ 0.1	20	3 12	9.7	Dec. 2	3 44	5.9
15	1 33	0.9	22	3 9	8.7	4	3 42	4.3
17	1 25	1.7	24	3 5	7.8	6	3 39	2.7
19	1 17	2.5	26	3 1	6.8	8	3 36	- 1.1
21	+1 9	+ 3.3	28	-2 57	+ 5.8	10	+3 31	+ 0.5
23	1 1	4.1	30	2 52	4.7	12	3 26	2.1
25	0 53	4.8	Sept. 1	2 47	3.6	14	3 21	3.7
27	0 46	5.6	3	2 41	2.5	16	3 15	5.3
29	0 38	6.3	5	2 35	1.4	18	3 8	6.9
31	+0 30	+ 7.0	7	-2 29	+ 0.2	20	+3 0	+ 8.4
2	0 22	7.7	9	2 22	- 1.0	22	2 52	10.0
4	0 15	8.4	11	2 15	2.2	24	2 44	11.5
6	+0 7	9.1	13	2 7	3.3	26	2 35	12.9
8	0 0	9.8	15	1 59	4.5	28	2 25	14.4
10	-0 7	+10.4	17	-1 50	- 5.7	30	+2 16	+15.8
12	-0 14	+11.0	19	-1 41	- 6.9	32	+2 5	+17.2

GREENWICH MEAN TIME.

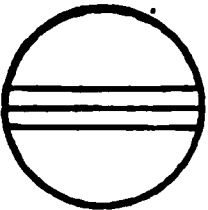
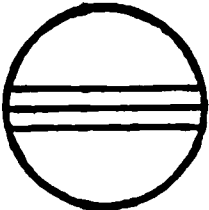
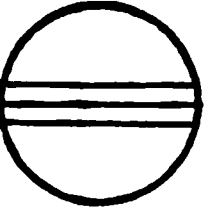
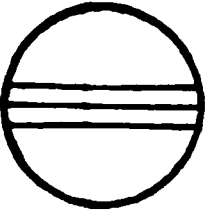
JANUARY.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	11	16		I.*Oc. D.	9	17	21		III.*Tr. E.	18	8	49		II. Tr. I.	27	4	1		I. Sh
	14	17	10	I.*Ec. R.		19	11		III.*Sh. I.		9	47		I. Sh. E.		5	0		I. Tr
						21	21		III. Sh. E.		11	3		II.*Sh. I.		5	40		II. Oc
2	8	30		I. Tr. I.							11	20		II.*Tr. E.		6	11		I. Sh
	9	19		I. Sh. I.	10	7	31		I. Oc. D.		13	34		II.*Sh. E.		10	34	10	II. E
	9	21		II. Oc. D.		10	41	41	I.*Ec. R.							12	15		III.*O
	10	39		I.*Tr. E.						19	3	47		I. Oc. D.		14	22		III.*O
	11	29		I.*Sh. E.	11	4	44		I. Tr. I.		7	6	23	I. Ec. R.		17	4	37	III.*E
	11	54		III.*Tr. I.		5	42		I. Sh. I.							19	19	14	III. E
	13	29	1	II.*Ec. R.		6	23		II. Tr. I.	20	1	0		I. Tr. I.					
	13	50		III.*Tr. E.		6	53		I. Tr. E.		2	6		I. Sh. I.	28	0	6		I. O
	15	11		III.*Sh. I.		7	52		I. Sh. E.		3	10		I. Tr. E.		3	31	1	I. E
	17	20		III.*Sh. E.		8	25		II. Sh. I.		3	14		II. Oc. D.		21	19		I. T
						8	54		II. Tr. E.		4	16		I. Sh. E.		22	30		I. S
3	5	43		I. Oc. D.		10	56		II.*Sh. E.		7	58	10	II. Ec. R.		23	28		I. T
	8	46	3	I. Ec. R.							8	35		III. Oc. D.					
					12	1	58		I. Oc. D.		10	39		III. Oc. R.	29	0	33		II. T
4	2	56		I. Tr. I.		5	10	40	I. Ec. R.		13	4	13	III.*Ec. D.		0	40		I. S
	3	47		I. Sh. I.		23	11		I. Tr. I.		15	17	32	III.*Ec. R.		3	1		II. S
	4	0		II. Tr. I.							22	15		I. Oc. D.		3	4		II. T
	5	6		I. Tr. E.	13	0	11		I. Sh. I.							5	32		II. S
	5	46		II. Sh. I.		0	51		II. Oc. D.	21	1	35	15	I. Ec. R.		18	34		I.*O
	5	57		I. Sh. E.		1	21		I. Tr. E.		19	28		I.*Tr. I.		22	0	0	I. E
	6	31		II. Tr. E.		2	21		I. Sh. E.		20	35		I. Sh. I.					
	8	17		II. Sh. E.		4	59		III. Oc. D.		21	37		I. Tr. E.	30	15	46		I.*T
						5	22	21	II. Ec. R.		22	3		II. Tr. I.		16	59		I.*S
5	0	10		I. Oc. D.		7	1		III. Oc. R.		22	45		I. Sh. E.		17	56		I.*T
	3	15	0	I. Ec. R.		9	3	12	III. Ec. D.							18	54		II.*O
	21	23		I. Tr. I.		11	15	14	III.*Ec. R.	22	0	23		II. Sh. I.		19	9		I. S
	22	16		I. Sh. I.		20	25		I. Oc. D.		0	34		II. Tr. E.		23	52	12	II. E
	22	30		II. Oc. D.		23	39	31	I. Ec. R.		2	54		II. Sh. E.					
	23	33		I. Tr. E.							16	43		I.*Oc. D.	31	2	16		III. T
					14	17	38		I.*Tr. I.		20	4	14	I. Ec. R.		4	22		III. T
6	0	26		I. Sh. E.		18	39		I.*Sh. I.							7	13		III. S
	1	28		III. Oc. D.		19	36		II.*Tr. I.	23	13	55		I.*Tr. I.		9	26		III. S
	2	46	42	II. Ec. R.		19	48		I.*Tr. E.		15	4		I.*Sh. I.		13	2		I.*O
	3	27		III. Oc. R.		20	49		I. Sh. E.		16	5		I.*Tr. E.		16	28	55	I.*E
	5	2	18	III. Ec. D.		21	44		II. Sh. I.		16	27		II.*Oc. D.					
	7	13	2	III. Ec. R.		22	7		II. Tr. E.		17	14		I.*Sh. E.					
	18	37		I.*Oc. D.							21	16	8	II. Ec. R.					
	21	43	50	I. Ec. R.	15	0	16		II. Sh. E.		22	32		III. Tr. I.					
						14	53		I.*Oc. D.										
7	15	50		I.*Tr. I.		18	8	29	I.*Ec. R.	24	0	36		III. Tr. E.					
	16	45		I.*Sh. I.							3	12		III. Sh. I.					
	17	13		II.*Tr. I.	16	12	6		I.*Tr. I.		5	24		III. Sh. E.					
	18	0		I.*Tr. E.		13	9		I.*Sh. I.		11	10		I.*Oc. D.					
	18	55		I.*Sh. E.		14	2		II.*Oc. D.		14	33	8	I.*Ec. R.					
	19	6		II.*Sh. I.		14	15		I.*Tr. E.										
	19	43		II.*Tr. E.		15	19		I.*Sh. E.	25	8	23		I. Tr. I.					
	21	37		II. Sh. E.		18	40	16	II.*Ec. R.		9	32		I. Sh. I.					
						18	55		III.*Tr. I.		10	33		I. Tr. E.					
8	13	4		I.*Oc. D.		20	56		III. Tr. E.		11	17		II.*Tr. I.					
	16	12	48	I.*Ec. R.		23	12		III. Sh. I.		11	43		I.*Sh. E.					
											13	41		II.*Sh. I.					
9	10	17		I. Tr. I.	17	1	22		III. Sh. E.		13	49		II.*Tr. E.					
	11	14		I.*Sh. I.		9	20		I. Oc. D.		16	13		II.*Sh. E.					
	11	40		II.*Oc. D.		12	37	23	I.*Ec. R.										
	12	26		I.*Tr. E.						26	5	38		I. Oc. D.					
	13	24		I.*Sh. E.	18	6	33		I. Tr. I.		9	2	8	I. Ec. R.					
	15	22		III.*Tr. I.		7	37		I. Sh. I.										
	16	4	32	II.*Ec. R.		8	42		I. Tr. E.	27	2	51		I. Tr. I.					

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

JANUARY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

 * r	III.	 * d * r
 * r	IV. No Eclipse.	

Configurations at 15^h 30^m for an Inverting Telescope.

West.		East.
	•2 ○ ⁴ ₁ 3•	
	4• 1• 3• ○ •2	
4• 3•	○	•1•
4• •3 2••1	○	
4• 3•	○	1•
•4 •1	○	•3•2
•4 1	○ ² ₁	•3
•4 2•	○	3• •1●
1•	○	•2●
3•	○	1• 2•
•3 1•	○	•4
•3 1•	○	1• •4
•1	○	•3 •2 •4
	○ ² ₁	•3 4•
2•	○	3• 4• •1●
1•	○ ³ ₁	4• •2●
3•	○	•1 4•
•3 1•2•4•	○	
4• •3•2	○	1•
4• •1	○	•3 •2
4• 1•	○	•3
4• 2• •1	○	3•
•4 •	○	2 3•
•4 3•	○	•1 2•
3• •4 1• 2•	○	
•3 •2 •4	○	•1
•1	○	•3 •2•4
	○	1•2• •3 •4
2• •1	○	3• •4
•2 ¹	○	3• •4
3•	○	•2 4• •1●

GREENWICH MEAN TIME.

FEBRUARY.

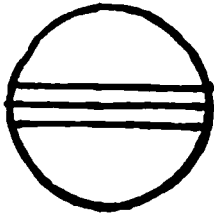
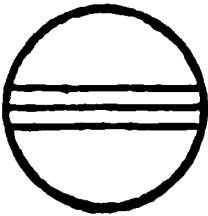
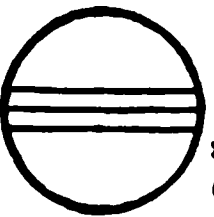
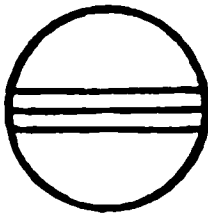
d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s		
1	10	15		I. Tr. I.	8	18	58		II. Sh. I.	16	14	49	30		I.*Ec. R.	24	12	34		I.*Tr.
	11	28		I.*Sh. I.		21	29		II. Sh. E.								13	52		I.*Sh.
	12	25		I.*Tr. E.						17	8	29			I. Tr. I.		15	49		II.*Oc.
	13	38		I.*Sh. E.	9	9	23		I. Oc. D.		9	47			I. Sh. I.		18	22		II. Oc.
	13	48		II.*Tr. I.		12	53	43	I.*Ec. R.		10	39			I. Tr. E.		18	27	28	II. Ec.
	16	19		II.*Tr. E.							11	57			I.*Sh. E.		20	59	29	II. Ec.
	16	20		II.*Sh. I.	10	6	35		I. Tr. I.		13	13			II.*Oc. D.					
	18	51		II.*Sh. E.		7	52		I. Sh. I.		15	46			II.*Oc. R.	25	3	48		III. Oc.
						8	45		I. Tr. E.		15	51	8		II.*Ec. D.		6	4		III. Oc.
2	7	30		I. Oc. D.		10	2		I. Sh. E.		18	22	54		II. Ec. R.		7	42		I. Oc.
	10	57	55	I. Ec. R.		10	40		II. Oc. D.		23	47			III. Oc. D.		9	8	28	III. Ec.
						13	12		II.*Oc. R.								11	14	8	I. Ec.
3	4	42		I. Tr. I.		13	14	58	II.*Ec. D.	18	2	2			III. Oc. R.		11	28	17	III.*Ec.
	5	56		I. Sh. I.		15	46	32	II.*Ec. R.		5	6	51		III. Ec. D.					
	6	52		I. Tr. E.		19	51		III. Oc. D.		5	46			I. Oc. D.	26	4	53		I. Tr.
	8	6		I. Sh. E.		22	4		III. Oc. R.		7	25	22		III. Ec. R.		6	11		I. Sh.
	8	9		II. Oc. D.							9	18	23		I. Ec. R.		7	3		I. Tr.
	13	10	15	II.*Ec. R.	11	1	5	53	III. Ec. D.								8	21		I. Sh.
	16	0		III.*Oc. D.		3	23	5	III. Ec. R.	19	2	58			I. Tr. I.		10	53		II. Tr.
	18	10		III.*Oc. R.		3	52		I. Oc. D.		4	16			I. Sh. I.		13	26		II.*Tr.
	21	5	3	III. Ec. D.		7	22	36	I. Ec. R.		5	8			I. Tr. E.		13	34		II.*Sh.
	23	20	58	III. Ec. R.							6	26			I. Sh. E.		16	5		II.*Sh.
					12	1	4		I. Tr. I.		8	15			II. Tr. I.					
4	1	58		I. Oc. D.		2	21		I. Sh. I.		10	47			II. Tr. E.	27	2	11		I. Oc.
	5	26	48	I. Ec. R.		3	13		I. Tr. E.		10	56			II. Sh. I.		5	43	6	I. Ec.
	23	11		I. Tr. I.		4	30		I. Sh. E.		13	27			II.*Sh. E.		23	22		I. Tr.
						5	38		II. Tr. I.											
5	0	25		I. Sh. I.		8	11		II. Tr. E.	20	0	15			I. Oc. D.	28	0	40		I. Sh.
	1	20		I. Tr. E.		8	18		II. Sh. I.		3	47	21		I. Ec. R.		1	31		I. Tr.
	2	35		I. Sh. E.		10	49		II. Sh. E.		21	27			I. Tr. I.		2	51		I. Sh.
	3	4		II. Tr. I.		22	20		I. Oc. D.		22	45			I. Sh. I.		5	8		II. Oc.
	5	36		II. Tr. E.							23	37			I. Tr. E.		7	41		II. Oc.
	5	40		II. Sh. I.	13	1	51	35	I. Ec. R.								7	45	38	II. Ec.
	8	11		II. Sh. E.		19	32		I. Tr. I.	21	0	55			I. Sh. E.		10	17	44	II. Ec.
	20	27		I. Oc. D.		20	49		I. Sh. I.		2	31			II. Oc. D.		17	57		III. Tr.
	23	55	48	I. Ec. R.		21	42		I. Tr. E.		5	3			II. Oc. R.		20	12		III. Tr.
						22	59		I. Sh. E.		5	9	19		II. Ec. D.		20	40		I. Oc.
6	17	39		I.*Tr. I.		23	56		II. Oc. D.		7	41	10		II. Ec. R.		23	16		III. Sh.
	18	54		I. Sh. I.							13	55			III.*Tr. I.					
	19	48		I. Tr. E.	14	2	29		II. Oc. R.		16	8			III.*Tr. E.					
	21	4		I. Sh. E.		2	33	5	II. Ec. D.		18	44			I. Oc. D.					
	21	24		II. Oc. D.		5	4	42	II. Ec. R.		19	15			III. Sh. I.					
	23	56		II. Oc. R.		9	58		III. Tr. I.		21	32			III. Sh. E.					
	23	56	56	II. Ec. D.		12	9		III.*Tr. E.		22	16	15		I. Ec. R.					
						15	15		III.*Sh. I.											
7	2	28	24	II. Ec. R.		16	49		I.*Oc. D.	22	15	55			I.*Tr. I.					
	6	4		III. Tr. I.		17	30		III.*Sh. E.		17	13			I.*Sh. I.					
	8	13		III. Tr. E.		20	20	29	I. Ec. R.		18	5			I. Tr. E.					
	11	14		III.*Sh. I.							19	24			I. Sh. E.					
	13	28		III.*Sh. E.	15	14	1		I.*Tr. I.		21	32			II. Tr. I.					
	14	55		I.*Oc. D.		15	18		I.*Sh. I.											
	18	24	42	I.*Ec. R.		16	11		I.*Tr. E.	23	0	5			II. Tr. E.					
						17	28		I.*Sh. E.		0	15			II. Sh. I.					
8	12	7		I.*Tr. I.		18	56		II. Tr. I.		2	46			II. Sh. E.					
	13	23		I.*Sh. I.		21	28		II. Tr. E.		13	14			I.*Oc. D.					
	14	17		I.*Tr. E.		21	37		II. Sh. I.		16	45	15		I.*Ec. R.					
	15	33		I.*Sh. E.																
	16	21		II.*Tr. I.	16	0	8		II. Sh. E.	24	10	24			I. Tr. I.					
	18	53		II. Tr. E.		11	18		I.*Oc. D.		11	42			I.*Sh. I.					

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; T transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

GREENWICH MEAN TIME.

FEBRUARY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

 <div>* r</div>	III.	 <div>* d * r</div>
 <div>* d * r</div>	IV. No Eclipse.	

Configurations at 14^h 45^m for an Inverting Telescope.

West.			East.		
3.	1.	○	4.		
.3	.2	○	.1	4.	
	1.	○	3	.24.	
	4.	○	1.2.	.3	
4.	2.	○		3.	
4.	.2	○	1.	3.	
4.	3.	○	.1	.2	
.4	3.	○	2.		
.4	.3	○	.1		
.4	1.	○	.3		.2●
	.4	○	.1	.3	
	.2	○	1.	.3	
	.3	○	.2	.4	
3.		○	2.		.4
.3	2.	○		.4	.1●
	.3	○		4.	.2●
		○	.1	4.	
	.3	○	4.	.3	
.2		○	4.1.	3.	
4.	.1	○	.2		
4.	3.	○	1.	2.	
4.	.3	○			.1●
4.		○	.3	2.	
.4		○	.3	2.	
.4	1.	○		.3	
.4	.2	○	1.	3.	
	.4.1	○	3.	.2	

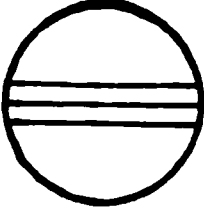
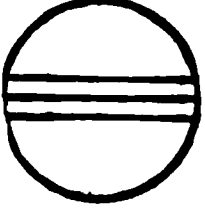
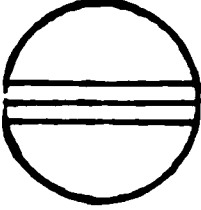
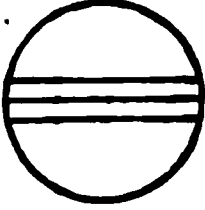
GREENWICH MEAN TIME.

MARCH.

d h m s		d h m s		d h m s		d h m s		d h m s	
1 0 11 59	I. Ec. R.	9 2 54	II. Tr. I.	17 17 28	I. Sh. I.	26 1 10 32	III. Ec.		
1 34	III. Sh. E.	5 27	II. Tr. E.	18 26	I. Tr. E.	3 35 36	III. Ec.		
17 51	I. Tr. I.	5 30	II. Sh. I.	19 39	I. Sh. E.	12 43	I.*Tr.		
19 9	I. Sh. I.	8 2	II. Sh. E.	23 48	II. Oc. D.	13 53	I.*Sh		
20 1	I. Tr. E.	17 7	I. Oc. D.			14 54	I.*Tr.		
21 19	I. Sh. E.	20 36 39	I. Ec. R.	18 4 49 49	II. Ec. R.	16 4	I. Sh		
				13 35	I.*Oc. D.	21 43	II. Tr		
2 0 13	II. Tr. I.	10 14 17	I.*Tr. I.	16 11	III.*Oc. D.				
2 46	II. Tr. E.	15 33	I.*Sh. I.	17 1 6	I. Ec. R.	27 0 4	II. Sh		
2 53	II. Sh. I.	16 28	I.*Tr. E.	18 34	III. Oc. R.	0 17	II. Tr		
5 24	II. Sh. E.	17 43	I. Sh. E.	21 10 23	III. Ec. D.	2 36	II. Sh		
15 10	I.*Oc. D.	21 6	II. Oc. D.	23 34 9	III. Ec. R.	10 3	I. Oc		
18 40 59	I. Ec. R.	23 40	II. Oc. R.			13 25 30	I.*Ec		
		23 40 28	II. Ec. D.	19 10 45	I. Tr. I.				
3 12 20	I.*Tr. I.			11 57	I.*Sh. I.	28 7 13	I. Tr		
13 38	I.*Sh. I.	11 2 12 56	II. Ec. R.	12 55	I.*Tr. E.	8 21	I. Sh		
14 31	I.*Tr. E.	11 36	I. Oc. D.	14 8	I.*Sh. E.	9 24	I. Tr		
15 48	I.*Sh. E.	12 0	III.*Oc. D.	18 59	II. Tr. I.	10 32	I. Sh		
18 27	II. Oc. D.	14 21	III.*Oc. R.	21 27	II. Sh. I.	15 53	II. Oc		
21 0	II. Oc. R.	15 5 30	I.*Ec. R.	21 32	II. Tr. E.	20 45 15	II. Ec		
21 3 53	II. Ec. D.	17 10 10	III. Ec. D.	23 59	II. Sh. E.				
23 36 8	II. Ec. R.	19 32 37	III. Ec. R.			29 4 33	I. Oc		
				20 8 4	I. Oc. D.	7 54 20	I. Ec		
4 7 52	III. Oc. D.	12 8 47	I. Tr. I.	11 30 1	I. Ec. R.	10 41	III. T		
9 39	I. Oc. D.	10 2	I. Sh. I.			13 4	III.*T		
10 11	III. Oc. R.	10 57	I. Tr. E.	21 5 14	I. Tr. I.	15 18	III.*Sh		
13 9 21	III.*Ec. D.	12 12	I.*Sh. E.	6 26	I. Sh. I.	17 42	III. Sh		
13 9 50	I.*Ec. R.	16 15	II.*Tr. I.	7 25	I. Tr. E.				
15 30 28	III.*Ec. R.	18 49	II. Tr. E.	8 37	I. Sh. E.	30 1 43	I. T		
		18 50	II. Sh. I.	13 9	II.*Oc. D.	2 50	I. Sh		
5 6 50	I. Tr. I.	21 21	II. Sh. E.	18 8 12	II. Ec. R.	3 54	I. T		
8 6	I. Sh. I.					5 1	I. Sh		
9 0	I. Tr. E.	13 6 6	I. Oc. D.	22 2 34	I. Oc. D.	11 6	II. T		
10 17	I. Sh. E.	9 34 26	I. Ec. R.	5 58 52	I. Ec. R.	13 23	II.*Sh		
13 34	II.*Tr. I.			6 26	III. Tr. I.	13 40	II.*T		
16 6	II.*Tr. E.	14 3 16	I. Tr. I.	8 47	III. Tr. E.	15 55	II. Sh		
16 12	II.*Sh. I.	4 31	I. Sh. I.	11 18	III. Sh. I.	23 3	I. Oc		
18 43	II. Sh. E.	5 27	I. Tr. E.	13 40	III.*Sh. E.				
		6 41	I. Sh. E.	23 44	I. Tr. I.	31 2 23 15	I. Ec		
6 4 8	I. Oc. D.	10 27	II. Oc. D.			20 13	I. T		
7 38 48	I. Ec. R.	15 31 19	II.*Ec. R.	23 0 55	I. Sh. I.	21 19	I. Sh		
				1 55	I. Tr. E.	22 24	I. Tr		
7 1 19	I. Tr. I.	15 0 35	I. Oc. D.	3 6	I. Sh. E.	23 30	I. Sh		
2 35	I. Sh. I.	2 12	III. Tr. I.	8 21	II. Tr. I.				
3 29	I. Tr. E.	4 3 18	I. Ec. R.	10 45	II. Sh. I.				
4 46	I. Sh. E.	4 31	III. Tr. E.	10 54	II. Tr. E.				
7 46	II. Oc. D.	7 17	III. Sh. I.	13 17	II.*Sh. E.				
10 20	II. Oc. R.	9 37	III. Sh. E.	21 4	I. Oc. D.				
10 22 6	II. Ec. D.	21 46	I. Tr. I.						
12 54 27	II.*Ec. R.	22 59	I. Sh. I.	24 0 27 48	I. Ec. R.				
22 3	III. Tr. I.	23 56	I. Tr. E.	18 14	I. Tr. I.				
22 37	I. Oc. D.			19 24	I. Sh. I.				
		16 1 10	I. Sh. E.	20 24	I. Tr. E.				
8 0 20	III. Tr. E.	5 37	II. Tr. I.	21 35	I. Sh. E.				
2 7 40	I. Ec. R.	8 8	II. Sh. I.						
3 16	III. Sh. I.	8 10	II. Tr. E.	25 2 31	II. Oc. D.				
5 36	III. Sh. E.	10 40	II. Sh. E.	7 26 52	II. Ec. R.				
19 48	I. Tr. I.	19 5	I. Oc. D.	15 34	I.*Oc. D.				
21 4	I. Sh. I.	22 32 16	I. Ec. R.	18 56 37	I. Ec. R.				
21 58	I. Tr. E.			20 26	III. Oc. D.				
23 15	I. Sh. E.	17 16 15	I.*Tr. I.	22 50	III. Oc. R.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

GREENWICH MEAN TIME.

MARCH.			
<i>Phases of the Eclipses of the Satellites for an Inverting Telescope.</i>			
	* r	III.	 * d * r
	* r	IV. No Eclipse.	

Configurations at 14^h 15^m for an Inverting Telescope.

West.		East.	
3.	○ 1 2.		
.3 2.	○ 1	.4	
.3 .2	○	.4	
	○ .1 .2	.4	.3 ●
1.	○	.3	4.
.2	○ .1	3.	4.
.1	○ 1 2.	4.	
3.	○ 1 2 4.		
3.	2. .1	○	
.3 4.	.2	○	
4.	○	.2	.1 ● .3 ●
4.	1. 2	○ .	.3
4.	2.	○ .1	3.
.4	1.	○ 3.	.2 ●
.4	3.	○ 1. 2.	
.3	.1	○	
.3	.2 4	○ 1.	
	.3 .4 .2		.1 ●
	1. ○ 2.	.3 .4	
2.	○ .1	3.	.4
1.	○ 3.	.4	.2 ●
3.	○ 1. 2.	4.	
3.	.1	○	4.
.3 .2	○ 1.	4.	
.3 .1	○	.2 4.	
	○ 2.	.3	
4. 2.	○ .1	.3	
4.	1. 2	○ 3.	
4.	3.	○ .1 .2	
4.	3.	.1 2.	○
.4	.3 .2	○ 1.	

GREENWICH MEAN TIME.

APRIL.

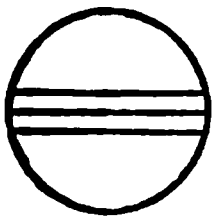
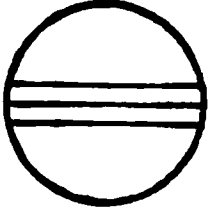
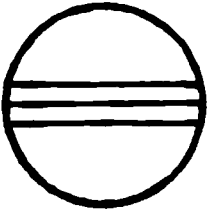
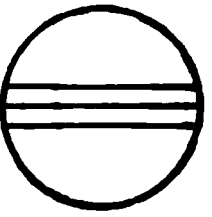
d h m s		d h m s		d h m s		d h m s		d h m s	
1 5 16	II. Oc. D.	9 18 54	I. Tr. E.	18 14 7	I.*Sh. I.	27 7 20	III. Sh.		
10 4 1	II. Ec. R.	19 55	I. Sh. E.	15 25	I. Tr. E.	9 44	I. T.		
17 33	I. Oc. D.			16 19	I. Sh. E.	9 49	III. Sh.		
20 52 4	I. Ec. R.	10 3 16	II. Tr. I.			10 31	I. S.		
		5 18	II. Sh. I.	19 0 13	II. Oc. D.	11 56	I. T.		
2 0 43	III. Oc. D.	5 50	II. Tr. E.	4 37 2	II. Ec. R.	12 43	I.*S		
3 8	III. Oc. R.	7 50	II. Sh. E.	10 34	I. Oc. D.	22 16	II. T		
5 11 2	III. Ec. D.	14 3	I.*Oc. D.	13 40 15	I.*Ec. R.	23 49	II. S		
7 37 23	III. Ec. R.	17 16 15	I. Ec. R.	23 43	III. Tr. I.				
14 43	I.*Tr. I.					28 0 50	II. T		
15 48	I. Sh. I.	11 11 13	I. Tr. I.	20 2 11	III. Tr. E.	2 22	II. S		
16 54	I. Tr. E.	12 12	I.*Sh. I.	3 19	III. Sh. I.	7 5	I. C		
17 59	I. Sh. E.	13 24	I.*Tr. E.	5 47	III. Sh. E.	10 4 9	I. I		
		14 23	I.*Sh. E.	7 43	I. Tr. I.				
3 0 29	II. Tr. I.	21 25	II. Oc. D.	8 36	I. Sh. I.	29 4 14	I. T		
2 41	II. Sh. I.			9 55	I. Tr. E.	5 0	I. S		
3 2	II. Tr. E.	12 1 59 40	II. Ec. R.	10 48	I. Sh. E.	6 27	I. T		
5 14	II. Sh. E.	8 33	I. Oc. D.	19 27	II. Tr. I.	7 12	I. S		
12 3	I.*Oc. D.	11 45 3	I. Ec. R.	21 13	II. Sh. I.	16 27	II. C		
15 20 56	I.*Ec. R.	19 21	III. Tr. I.	22 1	II. Tr. E.	20 33 28	II. I		
		21 47	III. Tr. E.	23 45	II. Sh. E.				
		23 19	III. Sh. I.			30 1 36	I. C		
4 9 13	I. Tr. I.			21 5 4	I. Oc. D.	4 32 53	I. I		
10 17	I. Sh. I.	13 1 46	III. Sh. E.	8 9 5	I. Ec. R.	18 14	III. C		
11 24	I. Tr. E.	5 43	I. Tr. I.			20 46	III. C		
12 28	I.*Sh. E.	6 41	I. Sh. I.	22 2 13	I. Tr. I.	21 13 12	III. I		
18 39	II. Oc. D.	7 54	I. Tr. E.	3 5	I. Sh. I.	22 45	I. T		
23 22 27	II. Ec. R.	8 52	I. Sh. E.	4 25	I. Tr. E.	23 29	I. S		
		16 39	II. Tr. I.	5 16	I. Sh. E.	23 44 49	III. I		
5 6 33	I. Oc. D.	18 36	II. Sh. I.	13 38	II.*Oc. D.				
9 49 44	I. Ec. R.	19 13	II. Tr. E.	17 55 59	II. Ec. R.				
15 0	III.*Tr. I.	21 9	II. Sh. E.	23 35	I. Oc. D.				
17 25	III. Tr. E.								
19 19	III. Sh. I.	14 3 4	I. Oc. D.	23 2 37 50	I. Ec. R.				
21 44	III. Sh. E.	6 13 54	I. Ec. R.	13 49	III.*Oc. D.				
				16 19	III. Oc. R.				
6 3 43	I. Tr. I.	15 0 13	I. Tr. I.	17 13 0	III. Ec. D.				
4 45	I. Sh. I.	1 10	I. Sh. I.	19 43 18	III. Ec. R.				
5 54	I. Tr. E.	2 24	I. Tr. E.	20 44	I. Tr. I.				
6 57	I. Sh. E.	3 21	I. Sh. E.	21 34	I. Sh. I.				
13 52	II.*Tr. I.	10 49	II. Oc. D.	22 56	I. Tr. E.				
16 0	II. Sh. I.	15 18 34	II. Ec. R.	23 46	I. Sh. E.				
16 26	II. Tr. E.	21 34	I. Oc. D.						
18 32	II. Sh. E.								
				24 8 51	II. Tr. I.				
7 1 3	I. Oc. D.	16 0 42 40	I. Ec. R.	10 31	II. Sh. I.				
4 18 37	I. Ec. R.	9 25	III. Oc. D.	11 25	II. Tr. E.				
22 12	I. Tr. I.	11 54	III. Oc. R.	13 4	II.*Sh. E.				
23 14	I. Sh. I.	13 12 41	III.*Ec. D.	18 5	I. Oc. D.				
		15 41 40	III. Ec. R.	21 6 37	I. Ec. R.				
8 0 24	I. Tr. E.	18 43	I. Tr. I.						
1 26	I. Sh. E.	19 38	I. Sh. I.						
8 2	II. Oc. D.	20 55	I. Tr. E.	25 15 14	I. Tr. I.				
12 41 15	II.*Ec. R.	21 50	I. Sh. E.	16 2	I. Sh. I.				
19 33	I. Oc. D.			17 26	I. Tr. E.				
22 47 25	I. Ec. R.	17 6 3	II. Tr. I.	18 14	I. Sh. E.				
		7 55	II. Sh. I.						
9 5 2	III. Oc. D.	8 37	II. Tr. E.	26 3 2	II. Oc. D.				
7 30	III. Oc. R.	10 27	II. Sh. E.	7 14 26	II. Ec. R.				
9 11 34	III. Ec. D.	16 4	I. Oc. D.	12 35	I.*Oc. D.				
11 39 15	III. Ec. R.	19 11 29	I. Ec. R.	15 35 21	I. Ec. R.				
16 43	I. Tr. I.								
17 43	I. Sh. I.	18 13 13	I.*Tr. I.	27 4 7	III. Tr. I.				
				6 38	III. Tr. E.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

GREENWICH MEAN TIME.

APRIL.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

 * r	III.	 * d * r
 * r	IV. No Eclipse.	

Configurations at 13^h 30^m for an Inverting Telescope.

West.	East.
.4	.3 .1 O .2
.4	1 O . 3
2 . . 4 O	.3 .1
1 . 2 O	.4 3 .
3 O .	.1 .2 .4
3 . 1 .	O
.3 .2	O 1 .
.3 .1	O .2 4 .
	O 1 . 2 .
2 .	.O 1 .34 .
	1 .
.2	O 4 . 3 .
4 .	O 3 . 2
4 . 3 . 1 .	O 2 .
4 . 3 . 2 .	O .1
4 . .3 .1	O
.4	O 1 . 2 .
.4	2 . .1 O .3
.4	.2 O 3 .
.4	O 3 . 2 .1
3 . 1 .	.O 4 2 .
3 . 2 .	O .1 .4
.3 1 .	.O .4
	O 1 . 2 .
	.O 3 . 4 .
.2	O 1 . 3 . 4 .
	O 2 3 . 4 .
3 . 1 .	O 2 . 4 .
3 . 2 .	O .1 .
.3 1 .4 .2	O
4 .	.3 O 1 . 2

GREENWICH MEAN TIME.

MAY.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	0	57		I. Tr. E.	5	11	59	7	I. Ec. R.	10	19	25	15	I. Ec. R.	15	7	46	26	III. Ec.
	1	41		I. Sh. E.												17	18		II. Tr.
	11	40		II. Tr. I.	6	6	16		I. Tr. I.	11	13	0		III.*Tr. I.		18	19		II. Sh.
	13	7		II.*Sh. I.		6	55		I. Sh. I.		13	47		I. Tr. I.		19	52		II. Tr.
	14	14		II. Tr. E.		8	28		I. Tr. E.		14	22		I. Sh. I.		20	52		II. Sh.
	15	41		II. Sh. E.		9	8		I. Sh. E.		15	20		III. Sh. I.					
	20	6		I. Oc. D.		19	17		II. Oc. D.		15	34		III. Tr. E.	16	0	9		I. Oc.
	23	1	38	I. Ec. R.		23	11	1	II. Ec. R.		16	0		I. Tr. E.		2	51	23	I. E.
											16	34		I. Sh. E.		21	18		I. Tr.
2	17	15		I. Tr. I.	7	3	37		I. Oc. D.		17	53		III. Sh. E.		21	48		I. Sh.
	17	58		I. Sh. I.		6	27	50	I. Ec. R.							23	31		I. Tr.
	19	28		I. Tr. E.		22	39		III. Oc. D.	12	3	53		II. Tr. I.					I. Sh.
	20	10		I. Sh. E.							5	1		II. Sh. I.	17	0	1		II. Oc.
						8	0	46	I. Tr. I.		6	28		II. Tr. E.		11	33		II. Sh.
3	5	52		II. Oc. D.		1	24		I. Sh. I.		7	34		II. Sh. E.		15	7	6	I. Oc.
	9	51	57	II. Ec. R.		2	59		I. Tr. E.		11	8		I. Oc. D.		18	39		I. Sh.
	14	36		I. Oc. D.		3	36		I. Sh. E.		13	53	59	I. Ec. R.		21	20	2	I. Tr.
	17	30	21	I. Ec. R.		3	45	40	III. Ec. R.										
						14	29		II. Tr. I.	13	8	17		I. Tr. I.	18	15	49		I. Oc.
4	8	33		III. Tr. I.		15	43		II. Sh. I.		8	50		I. Sh. I.		16	17		I. Sh.
	11	5		III. Tr. E.		17	3		II. Tr. E.		10	30		I. Tr. E.		17	28		III. Tr.
	11	20		III. Sh. I.		18	16		II. Sh. E.		11	3		I. Sh. E.		18	2		I. Tr.
	11	45		I. Tr. I.		22	7		I. Oc. D.		22	8		II. Oc. D.		18	29		I. Sh.
	12	26		I. Sh. I.												19	21		III. Tr.
	13	51		III.*Sh. E.	9	0	56	33	I. Ec. R.	14	1	48	37	II. Ec. R.		20	4		III. Tr.
	13	58		I.*Tr. E.		19	17		I. Tr. I.		5	38		I. Oc. D.		21	54		III. Tr.
	14	39		I. Sh. E.		19	53		I. Sh. I.		8	22	40	I. Ec. R.					
						21	29		I. Tr. E.										
5	1	4		II. Tr. I.		22	5		I. Sh. E.	15	2	48		I. Tr. I.	19	6	43		II. Tr.
	2	25		II. Sh. I.							3	6		III. Oc. D.		7	37		II. Sh.
	3	39		II. Tr. E.	10	8	42		II. Oc. D.		3	19		I. Sh. I.		9	17		II. Tr.
	4	58		II. Sh. E.		12	29	30	II. Ec. R.		5	1		I. Tr. E.		10	10		II. Sh.
	9	7		I. Oc. D.		16	38		I. Oc. D.		5	32		I. Sh. E.		13	9		I.*Oc.
																15	48	45	I. Tr.

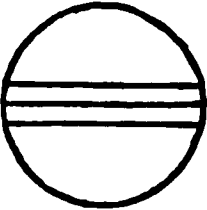
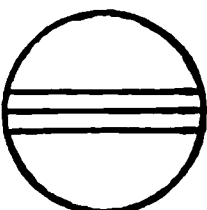
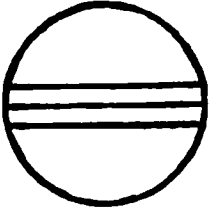
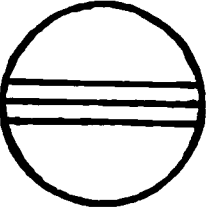
By reason of the proximity of JUPITER to the SUN the phenomena of the satellites are not given from May 20 to July 9.

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; transit of the satellite; Sh., transit of the shadow.

*Visible at Washington.

MAY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

 * r	III.	 * r
 * r	IV. No Eclipse.	

Configurations at 13^h 15^m for an Inverting Telescope.

West.				East.			
4.		•1	○		•3		
4.		•2	○	1.		•3	
•4			•1○	•2		3.	
•4			3.○	2.		.	
	•4	3.	2.	○	•1		
		•3	•4	1. 3	○		
			•3	○	•1	•2	
			•1	2○	•	•3•4	
		•2	○	1.		•3	•4
			•1	○	•2	3.	•4
			1○	•	2.		•4
		3.	2.	○		4.	•1●
	•3		•21.	○		4.	
		•3	○	•1	•2	4.	
		1.	○	2.	4. 3		
		2.	4.	○	1.		•3
	4.		•1	○		3.	•2●
	4.			○	1. 1.	2.	
4.		3.	2.	○			•1●
•4		3.	•2	1.○			

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SATELLITES OF JUPITER, 1918.

GREENWICH MEAN TIME.

JULY.

By reason of the proximity of JUPITER to the SUN the phenomena of the satellites are not given from May 20 to July 9.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
10	0	3		I. Oc. R.	15	7	49		II. Tr. E.	21	11	43		I. Sh. E.	26	17	36		I.
	18	38		I. Sh. I.		8	8		III. Tr. E.		12	20		I. Tr. E.		19	9		I.
	19	3		I. Tr. I.												19	50		I.
	20	52		I. Sh. E.	16	2	4		I. Sh. I.	22	6	43	57	I. Ec. D.					
	21	18		I.*Tr. E.		2	34		I. Tr. I.		6	49		II. Sh. I.	27	14	9	14	I.
						4	17		I. Sh. E.		7	18		III. Sh. I.		14	44	57	II.
11	13	7	48	III. Ec. D.		4	49		I. Tr. E.		8	0		II. Tr. I.		17	4		I.
	14	57		II. Sh. I.		22	49	47	II. Ec. D.		9	23		II. Sh. E.		18	48		II.
	15	49		II. Tr. I.		23	18	37	I. Ec. D.		9	34		I. Oc. R.					
	15	53	12	I. Ec. D.							9	44		III. Tr. I.	28	11	24		I.
	17	32		II. Sh. E.	17	2	3		I. Oc. R.		10	3		III. Sh. E.		12	6		I.
	17	43		III. Oc. R.		2	33		II. Oc. R.		10	36		II. Tr. E.		13	38		I.
	18	25		II. Tr. E.		20	33		I. Sh. I.		12	36		III. Tr. E.		14	20		I.
	18	33		I. Oc. R.		21	5		I.*Tr. I.										
						22	46		I. Sh. E.	23	3	58		I. Sh. I.	29	8	37	40	I.
12	13	7		I. Sh. I.		23	19		I. Tr. E.		4	35		I. Tr. I.		9	23		II.
	13	34		I. Tr. I.							6	12		I. Sh. E.		10	47		II.
	15	20		I. Sh. E.	18	17	6	54	III. Ec. D.		6	50		I. Tr. E.		11	17		III.
	15	48		I. Tr. E.		17	32		II. Sh. I.							11	34		I.
						17	47	3	I. Ec. D.	24	1	12	24	I. Ec. D.		11	57		II.
13	9	30	48	II. Ec. D.		18	37		II. Tr. I.		1	26	54	II. Ec. D.		13	23		II.
	10	21	40	I. Ec. D.		20	6		II. Sh. E.		4	4		I. Oc. R.		14	4		III.
	13	3		I. Oc. R.		20	33		I. Oc. R.		5	24		II. Oc. R.		14	9		III.
	13	7		II. Oc. R.		21	12		II.*Tr. E.		22	27		I. Sh. I.		17	3		III.
						22	11		III. Oc. R.		23	6		I. Tr. I.					
14	7	35		I. Sh. I.											30	5	53		I.
	8	4		I. Tr. I.	19	15	1		I. Sh. I.	25	0	41		I. Sh. E.		6	36		I.
	9	49		I. Sh. E.		15	35		I. Tr. I.		1	20		I. Tr. E.		8	6		I.
	10	18		I. Tr. E.		17	15		I. Sh. E.		19	40	49	I. Ec. D.		8	51		I.
						17	49		I. Tr. E.		20	6		II. Sh. I.					
15	3	19		III. Sh. I.							21	6	34	III.*Ec. D.	31	3	6	6	I.
	4	14		II. Sh. I.	20	12	7	52	II. Ec. D.		21	23		II.*Tr. I.		4	3	55	II.
	4	50	9	I. Ec. D.		12	15	29	I. Ec. D.		22	34		I. Oc. R.		6	4		I.
	5	13		II. Tr. I.		15	4		I. Oc. R.		22	40		II. Sh. E.		8	14		II.
	5	17		III. Tr. I.		15	58		II. Oc. R.		23	59		II. Tr. E.					
	6	3		III. Sh. E.															
	6	49		II. Sh. E.	21	9	30		I. Sh. I.	26	2	39		III. Oc. R.					
	7	33		I. Oc. R.		10	5		I. Tr. I.		16	56		I. Sh. I.					

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultat

transit of the satellite; Sh., transit of the shadow.

*Visible at Washington.

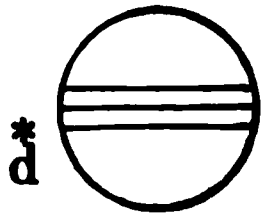
SATELLITES OF JUPITER, 1918.

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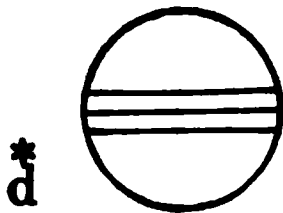
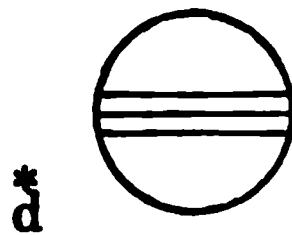
GREENWICH MEAN TIME.

JULY.

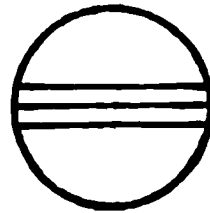
Phases of the Eclipses of the Satellites for an Inverting Telescope.



III.



IV. No Eclipse.



Configurations at 21^h 0^m for an Inverting Telescope.

West.

East.

Diagram illustrating the structure of a 16-point DFT (Discrete Fourier Transform) butterfly network. The diagram shows 16 input/output nodes arranged in a grid, with butterfly operations indicated by circles and numbers. The nodes are labeled with their indices (0 to 15) and the butterfly operations are labeled with their stages (1 to 4). The diagram is organized into four main sections, each representing a different butterfly stage.

GREENWICH MEAN TIME.

AUGUST.

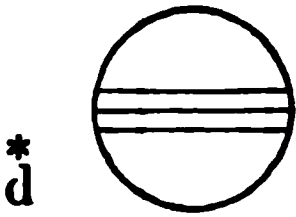
d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	0	22		I. Sh. I.	9	5	32		II. Tr. E.	17	23	2		I. Oc. R.	26	21	45		II.*Tr. I.
	1	6		I. Tr. I.		7	53	25	III. Ec. R.							22	14		II. Sh. E.
	2	35		I. Sh. E.		8	32		III. Oc. D.	18	3	15		II. Oc. R.					II. Tr. E.
	3	20		I. Tr. E.		11	29		III. Oc. R.		17	7		I. Sh. I.	27	0	22		III. Sh. I.
	21	34	30	I.*Ec. D.		20	44		I.*Sh. I.		18	6		I. Tr. I.		3	15		III. Sh. E.
	22	40		II. Sh. I.		21	37		I.*Tr. I.		19	21		I.*Sh. E.		6	5		III. Tr. I.
						22	58		I. Sh. E.		20	20		I.*Tr. E.		7	33		III. Tr. E.
2	0	10		II. Tr. I.		23	51		I. Tr. E.	19	14	18	24	I. Ec. D.		10	33		I. Sh. I.
	0	34		I. Oc. R.							17	5		II. Sh. I.		13	30		I. Tr. I.
	1	5	26	III. Ec. D.	10	17	56	29	I. Ec. D.		17	32		I. Oc. R.		14	34		I. Sh. E.
	1	14		II. Sh. E.		19	58	41	II.*Ec. D.		19	2		II.*Tr. I.		15	43		I. Tr. E.
	2	46		II. Tr. E.		21	3		I.*Oc. R.		19	40		II.*Sh. E.		16	49		
	3	53	30	III. Ec. R.							21	39		II.*Tr. E.	28	10	40	15	I. Ec. D.
	4	9		III. Oc. D.	11	0	27		II. Oc. R.		23	16		III. Sh. I.		14	0		I. Oc. R.
	7	5		III. Oc. R.		15	13		I. Sh. I.							14	30	41	II. Ec. D.
	18	50		I. Sh. I.		16	7		I. Tr. I.	20	2	5		III. Sh. E.		19	25		II.*Oc. R.
	19	37		I. Tr. I.		17	27		I. Sh. E.		3	15		III. Tr. I.					
	21	4		I.*Sh. E.		18	21		I. Tr. E.		6	14		III. Tr. E.	29	7	59		I. Sh. I.
	21	51		I. Tr. E.							11	36		I. Sh. I.		9	4		I. Tr. I.
					12	12	24	53	I. Ec. D.		12	36		I. Tr. I.		10	12		I. Sh. E.
3	16	2	53	I. Ec. D.		14	31		II. Sh. I.		13	49		I. Sh. E.		11	18		I. Tr. E.
	17	21	51	II. Ec. D.		15	33		I. Oc. R.		14	50		I. Tr. E.					
	19	4		I. Oc. R.		16	18		II. Tr. I.						30	5	8	35	I. Ec. D.
	21	38		II.*Oc. R.		17	6		II. Sh. E.							8	29		I. Oc. R.
						18	54		II. Tr. E.	21	8	46	48	I. Ec. D.		8	56		II. Sh. I.
4	13	19		I. Sh. I.		19	16		III. Sh. I.		11	54	11	II. Ec. D.		11	6		II. Tr. I.
	14	7		I. Tr. I.		22	4		III. Sh. E.		12	2		I. Oc. R.		11	31		II. Sh. E.
	15	32		I. Sh. E.		22	55		III. Tr. I.		16	39		II. Oc. R.		13	44		II. Tr. E.
	16	21		I. Tr. E.												16	59	3	III. Ec. D.
					13	1	52		III. Tr. E.	22	6	5		I. Sh. I.		19	51	56	III.*Ec. R.
5	10	31	18	I. Ec. D.		9	42		I. Sh. I.		7	6		I. Tr. I.		21	27		III.*Oc. D.
	11	57		II. Sh. I.		10	36		I. Tr. I.		8	18		I. Sh. E.					
	13	32		II. Tr. I.		11	55		I. Sh. E.		9	20		I. Tr. E.					
	13	34		I. Oc. R.		12	51		I. Tr. E.						31	0	30		III. Oc. R.
	14	32		II. Sh. E.						23	3	15	8	I. Ec. D.		2	27		I. Sh. I.
	15	17		III. Sh. I.	14	6	53	17	I. Ec. D.		6	22		II. Sh. I.		3	34		I. Tr. I.
	16	9		II. Tr. E.		9	17	32	II. Ec. D.		6	31		I. Oc. R.		4	41		I. Sh. E.
	18	4		III. Sh. E.		10	3		I. Oc. R.		8	24		II. Tr. I.		5	48		I. Tr. E.
	18	33		III. Tr. I.		13	52		II. Oc. R.		8	57		II. Sh. E.		23	36	56	I. Ec. D.
	21	28		III.*Tr. E.							11	1		II. Tr. E.					
					15	4	10		I. Sh. I.		13	0	27	III. Ec. D.					
6	7	47		I. Sh. I.		5	6		I. Tr. I.		15	52	8	III. Ec. R.					
	8	37		I. Tr. I.		6	24		I. Sh. E.		17	11		III. Oc. D.					
	10	1		I. Sh. E.		7	21		I. Tr. E.		20	12		III.*Oc. R.					
	10	51		I. Tr. E.															
					16	1	21	39	I. Ec. D.	24	0	33		I. Sh. I.					
7	4	59	43	I. Ec. D.		3	48		II. Sh. I.		1	35		I. Tr. I.					
	6	40	46	II. Ec. D.		4	33		I. Oc. R.		2	46		I. Sh. E.					
	8	4		I. Oc. R.		5	40		II. Tr. I.		3	49		I. Tr. E.					
	11	3		II. Oc. R.		6	23		II. Sh. E.		21	43	30	I.*Ec. D.					
						8	17		II. Tr. E.										
8	2	16		I. Sh. I.		9	2	18	III. Ec. D.	25	1	1		I. Oc. R.					
	3	7		I. Tr. I.		11	52	47	III. Ec. R.		1	12	1	II. Ec. D.					
	4	29		I. Sh. E.		12	52		III. Oc. D.		6	2		II. Oc. R.					
	5	21		I. Tr. E.		15	51		III. Oc. R.		19	2		I.*Sh. I.					
	23	28	6	I. Ec. D.		22	39		I. Sh. I.		20	5		I.*Tr. I.					
						23	36		I. Tr. I.		21	15		I.*Sh. E.					
											22	19		I. Tr. E.					
9	1	14		II. Sh. I.					I. Sh. E.					I. Ec. D.					
	2	33		I. Oc. R.	17	0	52		I. Tr. E.	26	16	11	51	I.*Oc. R.					
	2	55		II. Tr. I.		1	51		I.*Ec. D.		19	30		II.*Sh. I.					
	3	49		II. Sh. E.		19	50	1	II. Ec. D.		19	38							
	5	4	9	III. Ec. D.		22	35	25											

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

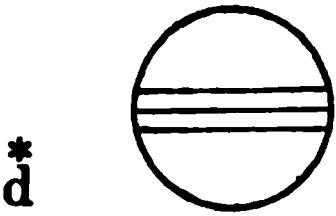
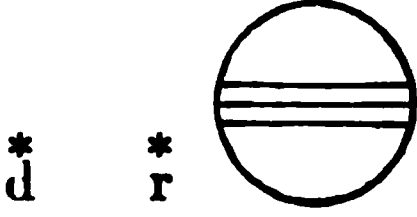
GREENWICH MEAN TIME.

AUGUST.

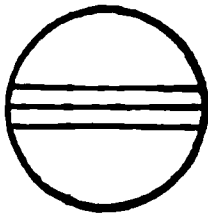
Phases of the Eclipses of the Satellites for an Inverting Telescope.



III.



IV. No Eclipse.



Configurations at 20^h 30^m for an Inverting Telescope.

West.				East.			
		•3 •1	○ 2•		•4		
	2•		○	•3		•4	
			○ •1		•3		•4 •2●
		1•	○	2• 3•		4•	
		2•	○	•1		4•	
	3•	•2 •1	○		4•		
	•3		○	•1 •2			
		•34• •1	○ 2•				
	4•	2•	○	•1 •3			
	4•		○		•3		•1● •2●
4•		1•	○	2• 3•			
•4		2•	○	3• •1			
•4		3• •2 1•	○				
	•4 •3		○	•1			
		•3 •1	○	2•			
		2•	○	•1			
			○				
		•2	○	•4 •3			•1●
		1•	○	•2 3•	•4		
			○	•1		•4	
		•1	○			•4	
	3•		○	•2 •1		4•	
	•3	•1	○	2•		4•	
	2•		○	•3 1•	4•		
		•2 •1	○	4•	•3		
	4•		○	•2 3•			
	4•		○	•1 3•			
4•		2• 3• 1•	○				
4•	3•		○	•2 •1			
•4	•3	1•	○	2•			
•4		2•	○	•3 1•			
	•4	•2 •1	○	•3			

MEAN TIME.

SEPTEMBER.

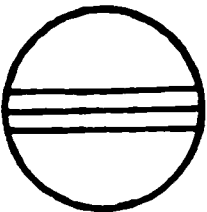
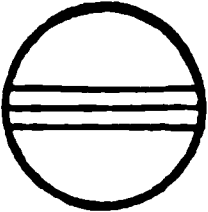
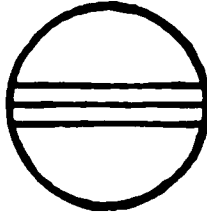
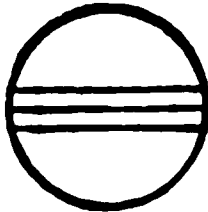
d h m s		d h m s		d h m s		d h m s	
1 259	I. Oc. R.	10 046	I. Oc. R.	17 18 5	III.*Sh. E.	26 323	III. Tr.
3 48 30	II. Ec. D.	3 8	II. Sh. I.	19 12	I.*Sh. I.	18 13 46	I.*Ec.
8 47	II. Oc. R.	9 22	II. Tr. I.	20 12	III.*Tr. I.	21 46	I.*Oc.
20 56	I.*Sh. I.	5 46	II. Sh. E.	20 27	I.*Tr. I.		
22 3	I.*Tr. I.	11 13	II. Tr. E.	21 25	I.*Sh. E.	26 055 5	II. Ec.
23 9	I. Sh. E.	14 5	III. Sh. I.	22 41	I. Tr. E.	6 14	II. Oc.
		16 2	III. Sh. E.	23 16	III. Tr. E.	15 35	I. Sh.
2 017	I. Tr. E.	17 18	III. Tr. I.			16 51	I. Tr.
18 5 17	I. Ec. D.	18 30	I. Sh. I.	18 16 20 25	I. Ec. D.	17 48	I.*Sh.
21 28	I.*Oc. R.	19 5	I.*Tr. I.	19 51	I.*Oc. R.	19 5	I.*Tr.
22 12	II. Sh. I.	19 31	III.*Tr. E.	22 19 13	II.*Ec. D.		
		20 44	I.*Sh. E.			27 12 42 5	I. Ec.
3 027	II. Tr. I.		I.*Tr. E.	19 334	II. Oc. R.	16 15	I. Oc.
0 48	II. Sh. E.			9 17	IV. Oc. D.	18 48	IV.*Tr.
3 4	II. Tr. E.			10 18	IV. Oc. R.	19 11	II.*Sh.
7 14	III. Sh. I.	11 013	IV. Tr. I.	13 41	I. Sh. I.	20 14	IV.*Tr.
10 5	III. Sh. E.	1 4	IV. Tr. E.	14 56	I. Tr. I.	21 46	II.*Tr.
11 49	III. Tr. I.	14 27 3	I. Ec. D.	15 54	I. Sh. E.	21 47	II.*Sh.
14 51	III. Tr. E.	17 54	I.*Oc. R.	17 10	I. Tr. E.		
15 24	I. Sh. I.	19 43 13	II.*Ec. D.				
16 33	I. Tr. I.			20 10 48 44	I. Ec. D.	8 53 45	II. Tr.
17 23	I. Sh. E.	12 053	II. Oc. R.	14 20	I. Oc. R.	10 3	III. Ec.
18 47	I.*Tr. E.	11 47	I. Sh. I.	16 37	II. Sh. I.	11 20	I. Sh.
		12 59	I. Tr. I.	19 7	II.*Tr. I.	11 51 16	I. Tr.
4 12 33 40	I. Ec. D.	14 0	I. Sh. E.	19 13	II.*Sh. E.	12 16	III. Ec.
15 57	I. Oc. R.	15 13	I. Tr. E.	21 45	II.*Tr. E.	13 34	I. Sh.
17 7 2	II. Ec. D.					14 7	I. Tr.
22 10	II. Oc. R.	13 8 55 24	I. Ec. D.	21 455 24	III. Ec. D.	17 14	III. Oc.
		12 23	I. Oc. R.	7 51 47	III. Ec. R.		III.*Oc.
5 9 53	I. Sh. I.	14 3	II. Sh. I.	8 9	I. Sh. I.	29 7 10 26	I. Ec.
11 2	I. Tr. I.	16 28	II. Tr. I.	9 25	I. Tr. I.	10 43	I. Oc.
12 6	I. Sh. E.	16 39	II. Sh. E.	10 2	III. Oc. D.	14 12 41	II. Ec.
13 16	I. Tr. E.	19 6	II.*Tr. E.	10 22	I. Sh. E.	19 32	II.*Oc.
				11 20	I. Tr. E.		
6 7 2 0	I. Ec. D.	14 056 56	III. Ec. D.	13 9	III. Oc. R.	30 431	I. Sh.
10 27	I. Oc. R.	3 52 10	III. Ec. R.			5 48	I. Tr.
11 29	II. Sh. I.	5 54	III. Oc. D.	22 5 17 4	I. Ec. D.	6 45	I. Sh.
12 45	II. Tr. I.	6 15	I. Sh. I.	5 48	I. Oc. R.	8 3	I. Tr.
14 5	II. Sh. E.	7 28	I. Tr. I.	11 36 51	II. Ec. D.		
16 28	II. Tr. E.	8 28	I. Sh. E.	16 54	II. Oc. R.		
20 57 41	III.*Ec. D.	8 59	III. Oc. R.				
23 51 45	III. Ec. R.	9 42	I. Tr. E.	23 238	I. Sh. I.		
				3 54	I. Tr. I.		
7 142	III. Oc. D.	15 323 42	I. Ec. D.	4 51	I. Sh. E.		
4 21	I. Sh. I.	5 54	I. Oc. R.	6 8	I. Tr. E.		
4 46	III. Oc. R.	9 0 53	II. Ec. D.	23 45 24	I. Ec. D.		
5 32	I. Tr. I.	14 13	II. Oc. R.				
5 55	I. Sh. E.			24 317	I. Oc. R.		
7 46	I. Tr. E.	16 044	I. Sh. I.	5 54	II. Sh. I.		
		1 10	I. Tr. I.	5 54	II. Tr. I.		
8 130 20	I. Ec. D.	2 57	I. Sh. E.	5 54	II. Sh. E.		
4 56	I. Oc. R.	4 12	I. Tr. E.	11 5	II. Tr. E.		
6 24 42	II. Ec. D.	21 52 2	I.*Ec. D.	19 10	III.*Sh. I.		
11 31	II. Oc. R.			21 8	I.*Sh. I.		
22 50	I. Sh. I.	17 122	I. Oc. R.	22 4	III.*Sh. E.		
		3 20	II. Sh. I.	5 54	I.*Tr. I.		
9 0 1	I. Tr. I.	5 48	II. Tr. I.	23 19	I. Sh. E.		
1 3	I. Sh. E.	5 56	II. Sh. E.				
2 15	I. Tr. E.	8 26	II. Tr. E.	25 019	III. Tr. I.		
19 58 41	I.*Ec. D.	15 11	III. Sh. I.	0 37	I. Tr. E.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; transit of the satellite; Sh., transit of the shadow.

*Visible at Washington.

SEPTEMBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

<div> <div>d*</div>  </div>	<div> <div>III.</div> <div> <div>d*</div> <div>r*</div> </div>  </div>
<div> <div>d*</div>  </div>	<div> <div>IV. No Eclipse.</div>  </div>

Configurations at 20^h 0^m for an Inverting Telescope.

West.	East.
.4	○ 1. .2 3.
	○ .4 [*] 3. .1●
2. 3.1.	○ .4
3.	○ .1 .4 .2●
.3 1.	○ 2. .4
² . ₃	○ 1. 4.
.2 .1	○ .3 4.
	○ 1. .2 .3 4.
	○ 2. ³ . ₄ .1●
1. 2. 3.	○ 4.
3. 4.	○ .1 .2●
4. .3 1.	○ .2
4.	.3 2.○ .1
4.	.2 .1 ○ .3
.4	○ 1 [*] . ₂ .3
.4	.1 ○ 2. 3.
	³ .
.4 2. 1.	○ .
3. .4.2	○ .1
.3 1.	○ .4 .2
.3	○ .1 .4
.2 1.	○ .3 .4
	○ .21. .3 .4
.1	○ 2. 3. 4.
2.	○ ³ . ₁ 4.
3. .2	○ 4. .1●
3.	1.○ ⁴ . ₃
.3	○ 2. .1
⁴ . ₂ 1.	○ .3
4.	○ .2 .1 .3
4.	.1 ○ 2. 3.

GREENWICH MEAN TIME.

OCTOBER.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	138	45		I. Ec. D.	9	211			I. Tr. I.	17	327			I. Oc. R.	25	2015	41		I.*Ec.
	512			I. Oc. R.		37			I. Sh. E.		841	44		II. Ec. D.		2346			I. Oc.
	828			II. Sh. I.		37			III. Sh. I.		140			II. Oc. R.					II. Sh.
	113			II. Tr. I.		425			I. Tr. E.		2116			I.*Sh. I.	26	528			II. T.
	115			II. Sh. E.		64			III. Sh. E.		2232			I.*Tr. I.		757			II. Sh.
	1342			II. Tr. E.		821			III. Tr. I.		2329			I. Sh. E.		86			II. T.
	230			I. Sh. I.		1128			III. Tr. E.					I. Tr. E.		1036			I.*S
	238			III. Sh. I.		22030			I.*Ec. D.	18	046			I.*Ec. D.		1738			I.*T
											1822	14		I.*Oc. R.		1851			I.*S
2	017			I. Tr. I.	10	134			I. Oc. R.		2155					215			I.*T
	113			I. Sh. E.		6619			II. Ec. D.					II. Sh. I.					III. F
	24			III. Sh. E.		1126			II. Oc. R.	19	254			II. Tr. I.	27	046	41		III. F
	231			I. Tr. E.		1922			I.*Sh. I.		527			II. Sh. E.		348	43		III. C
	422			III. Tr. I.		2039			I.*Tr. I.		531			II. Tr. E.		546			III. C
	727			III. Tr. E.		2135			I.*Sh. E.		86			I.*Sh. I.		856			I. I
	2077			I.*Ec. D.		2253			I. Tr. E.		1544			I.*Tr. I.		1444	5		I.*C
	2341			I. Oc. R.					I.*Ec. D.		170			I.*Sh. E.		1814			
					11	1628	49		I.*Oc. R.		1757			I.*Tr. E.					
3	330	46		II. Ec. D.		202					2048	6		III.*Ec. D.	28	034	20		II. I
	851			II. Oc. R.					II. Sh. I.		2349	1		III. Ec. R.		545			II. C
	1728			I.*Sh. I.	12	019			II. Tr. I.						126				I. S
	1846			I.*Tr. I.		255			II. Sh. E.	20	157			III. Oc. D.		1319			I. T
	1942			I.*Sh. E.		256			II. Tr. E.		57			III. Oc. R.		1420			I. S
	210			I.*Tr. E.		534			I. Sh. I.		1250	36		I. Ec. D.		1533			I.*T
						1350			I. Tr. I.		1623			I.*Oc. R.					
4	1435	27		I. Ec. D.		158			I.*Sh. E.		2159	10		II.*Ec. D.	29	912	25		I. I
	189			I.*Oc. R.		164			III.*Ec. D.						1241				I. C
	2145			II.*Sh. I.		1649	35		I.*Tr. E.	21	315			II. Oc. R.		1845			II.*S
						1722			III.*Ec. R.		1012			I. Sh. I.		2111			II.*T
5	021			II. Tr. I.		1949	22		III.*Oc. D.		1128			I. Tr. I.		2123			II.*S
	022			II. Sh. E.		224					1226			I. Sh. E.		2351			II. T
	259			II. Tr. E.					III. Oc. R.		1342			I. Tr. E.					
	1157			I. Sh. I.	13	114			I. Ec. D.										
	1251	38		III. Ec. D.		1057	12		I. Oc. R.	22	718	56		I. Ec. D.	30	634			I. S
	1314			I. Tr. I.		1431			II.*Ec. D.		1051			I. Oc. R.		746			I. T
	1410			I. Sh. E.		1923	48				1611			II.*Sh. I.		848			I. S
	1528			I. Tr. E.					II. Oc. R.		1842			II.*Tr. I.		100			I. T
	1550	18		III. Ec. R.	14	043			I. Sh. I.		1849			II.*Sh. E.		153			III.*S
	187			III.*Oc. D.		819			I. Tr. I.		217			IV.*Oc. D.		183			III.*S
	2116			III.*Oc. R.		936			I. Sh. E.		2122			II.*Tr. E.		193			IV.*S
						1032			I. Tr. E.		2257			IV. Oc. R.		1949			IV.*S
6	336			IV. Oc. D.		1150			IV. Tr. I.						1953				III.*T
	57			IV. Oc. R.		1244			IV. Tr. E.	23	441			I. Sh. I.		232			III.*T
	9348			I. Ec. D.		1428					556			I. Tr. I.	31	340	50		I. T
	1238			I. Oc. R.					I. Ec. D.		654			I. Sh. E.		547			IV. T
	1648	20		II.*Ec. D.	15	525	30		I. Oc. R.		810			I. Tr. E.		79			I. C
	229			II.*Oc. R.		859			II. Sh. I.		114			III. Sh. I.		745			IV. T
						1337			II.*Tr. I.		144			III. Sh. E.		1352	5		II. T
7	625			I. Sh. I.		1611			II.*Sh. E.		167			III.*Tr. I.		1859			II.*T
	743			I. Tr. I.		1614			II.*Tr. E.		1915								
	838			I. Sh. E.		1850								I. Ec. D.					
	957			I. Tr. E.					I. Sh. I.	24	147	21		I. Oc. R.					
					16	247			I. Tr. I.		518			II. Ec. D.					
8	332	7		I. Ec. D.		44			I. Sh. E.		1117	0		II.*Oc. R.					
	76			I. Oc. R.		50			I. Tr. E.		1630			I. Sh. I.					
	112			II. Sh. I.		618			III. Sh. I.		239								
	1338			II. Tr. I.		76			III. Sh. E.					I. Tr. I.					
	1339			II. Sh. E.		104			III. Tr. I.	25	024			I. Sh. E.					
	1617			II.*Tr. E.		1216			III. Tr. E.		123			I. Tr. E.					
						1524			I. Ec. D.		237								
9	054			I. Sh. I.		2353	54												

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; transit of the satellite; Sh., transit of the shadow.

*Visible at Washington.

GREENWICH MEAN TIME.

OCTOBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

<div><div>*</div><div>d</div></div> <div></div>	III.	<div><div>*</div><div>d</div></div> <div><div>*</div><div>r</div></div> <div></div>
<div><div>*</div><div>d</div></div> <div></div>	IV. No Eclipse.	

Configurations at 19^h 15^m for an Inverting Telescope.

West.	East.
4.	2. 1.
.4	.1
.4 3.	.2
.4.3	.1.2
2. 1.	.3 ●
	.1. 3. .2 ●
1.	2. .3
2.	1.3. .4
.23.1	.4
3.	1. 2. 4.
.3	2. 4. .1 ●
2. 1.	4. .3 ●
.2	.14. 3
1. 4.	.2 3.
	.3
4.	1. 3.
4. .2 .1.	
4. 3.	1. 2
.4 .3	2. .1 ●
.4	2. 3.
.4	.2 .1 3
.4 1.	.2 3
	.1 3.
.2 .1	.4
3.	1. 4
.3 .1	2. .4
.2	.4
.2 .1 3	4.
1.	.2 .3 4.
	2. .1 3.4.
2. 1.	4.
3. 4.	.2 1.

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SATELLITES OF JUPITER, 1918.

GREENWICH MEAN TIME.

NOVEMBER.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	1	3		I. Sh. I.	9	3	25		I. Oc. R.	17	0	18		I. Tr. I.	25	1	27		I. Oc. R.
	2	13		I. Tr. I.		10	37		II. Sh. I.		1	32		I. Sh. E.		5	18		IV. Oc. D.
	3	16		I. Sh. E.		12	50		II. Tr. I.		2	32		I. Tr. E.		7	24		IV. Oc. R.
	4	27		I. Tr. E.		13	16		II. Sh. E.		12	43	1	III. Ec. D.		10	54	2	II. Ec. D.
	22	9	12	I.*Ec. D.		15	31		II.*Tr. E.		15	48	16	III.*Ec. R.		15	19		II.*Oc. R.
						21	25		I.*Sh. I.		16	43		III.*Oc. D.		19	40		I.*Sh. I.
3	1	36		I. Oc. R.		22	30		I.*Tr. I.		19	55		III.*Oc. R.		20	31		I.*Tr. I.
	8	3		II. Sh. I.		23	38		I. Sh. E.		20	24	55	I.*Ec. D.		21	54		I.*Sh. E.
	10	25		II. Tr. I.							23	40		I. Oc. R.		22	45		I.*Tr. E.
	10	41		II. Sh. E.	10	0	44		I. Tr. E.										
	13	5		II. Tr. E.		8	44	30	III. Ec. D.	18	8	19	15	II. Ec. D.	26	16	47	9	I.*Ec. D.
	19	31		I.*Sh. I.		11	48	42	III. Ec. R.		12	59		II. Oc. R.		19	53		I.*Oc. R.
	20	41		I.*Tr. I.		13	9		III. Oc. D.		17	47		I.*Sh. I.					
	21	45		I.*Sh. E.		16	21		III.*Oc. R.		18	44		I.*Tr. I.	27	5	5		II. Sh. I.
	22	55		I.*Tr. E.		18	31	13	I.*Ec. D.		20	1		I.*Sh. E.		6	45		II. Tr. I.
						21	53		I.*Oc. R.		20	59		I.*Tr. E.		7	45		II. Sh. E.
3	4	45	56	III. Ec. D.											9	27			II. Tr. E.
	7	49	4	III. Ec. R.	11	5	44	23	II. Ec. D.	19	14	53	19	I.*Ec. D.		14	9		I.*Sh. I.
	9	30		III. Oc. D.		10	36		II. Oc. R.		18	7		I.*Oc. R.		14	57		I.*Tr. I.
	12	41		III. Oc. R.		15	53		I.*Sh. I.							16	23		I.*Sh. E.
	16	37	37	I.*Ec. D.		16	57		I.*Tr. I.	20	2	30		II. Sh. I.		17	12		I.*Tr. E.
	20	4		I.*Oc. R.		18	7		I.*Sh. E.		4	25		II. Tr. I.					
						19	11		I.*Tr. E.		5	9		II. Sh. E.	28	6	56		III. Sh. I.
4	3	9	27	II. Ec. D.							7	6		II. Tr. E.		10	2		III. Sh. E.
	8	12		II. Oc. R.	12	12	59	36	I. Ec. D.		12	15		I. Sh. I.		10	10		III. Tr. I.
	14	0		I. Sh. I.		16	20		I.*Oc. R.		13	11		I. Tr. I.		11	15	43	I. Ec. D.
	15	8		I.*Tr. I.		23	55		II. Sh. I.		14	29		I.*Sh. E.		13	20		III.*Tr. E.
	16	13		I.*Sh. E.							15	25		I.*Tr. E.		14	20		I.*Oc. R.
	17	23		I.*Tr. E.	13	2	2		II. Tr. I.										
						2	34		II. Sh. E.	21	2	57		III. Sh. I.	29	0	11	28	II. Ec. D.
5	11	5	58	I. Ec. D.		4	43		II. Tr. E.		6	1		III. Sh. E.		4	28		II. Oc. R.
	14	31		I.*Oc. R.		10	21		I. Sh. I.		6	42		III. Tr. I.		8	37		I. Sh. I.
	21	20		II.*Sh. I.		11	24		I. Tr. I.		9	21	49	I. Ec. D.		9	24		I. Tr. I.
	23	38		II. Tr. I.		12	35		I. Sh. E.		9	52		III. Tr. E.		10	51		I. Sh. E.
	23	59		II. Sh. E.		13	38		I. Tr. E.		12	34		I. Oc. R.		11	38		I. Tr. E.
						22	59		III.*Sh. I.		21	36	46	II.*Ec. D.					
6	2	18		II. Tr. E.											30	5	44	8	I. Ec. D.
	8	28		I. Sh. I.	14	2	2		III. Sh. E.	22	2	9		II. Oc. R.		8	46		I. Oc. R.
	9	36		I. Tr. I.		3	10		III. Tr. I.		6	43		I. Sh. I.		18	23		II.*Sh. I.
	10	42		I. Sh. E.		6	20		III. Tr. E.		7	38		I. Tr. I.		19	54		II.*Tr. I.
	11	50		I. Tr. E.		7	28	4	I. Ec. D.		8	57		I. Sh. E.		21	3		II.*Sh. E.
	19	1		III.*Sh. I.		10	47		I. Oc. R.		9	52		I. Tr. E.		22	36		II.*Tr. E.
	22	2		III.*Sh. E.		19	2	0	II.*Ec. D.										
	23	34		III. Tr. I.		23	48		II. Oc. R.	23	3	50	14	I. Ec. D.					
											7	0		I. Oc. R.					
7	2	43		III. Tr. E.	15	4	50		I. Sh. I.		15	47		II.*Sh. I.					
	5	34	24	I. Ec. D.		5	51		I. Tr. I.		17	35		II.*Tr. I.					
	8	58		I. Oc. R.		7	4		I. Sh. E.		18	27		II.*Sh. E.					
	16	27	4	II.*Ec. D.		8	5		I. Tr. E.		20	16		II.*Tr. E.					
	21	25		II.*Oc. R.															
					16	1	56	28	I. Ec. D.	24	1	12		I. Sh. I.					
8	2	56		I. Sh. I.		5	13		I. Oc. R.		2	4		I. Tr. I.					
	3	25	38	IV. Ec. D.		12	51		IV. Sh. I.		3	26		I. Sh. E.					
	4	3		I. Tr. I.		13	12		II. Sh. I.		4	19		I. Tr. E.					
	4	18	3	IV. Ec. R.		14	9		IV.*Sh. E.		16	41	11	III.*Ec. D.					
	5	10		I. Sh. E.		15	14		II.*Tr. I.		19	47	29	III.*Ec. R.					
	6	17		I. Tr. E.		15	51		II.*Sh. E.		20	12		III.*Oc. D.					
	13	42		IV. Oc. D.		17	54		II.*Tr. E.		21	16	16	IV.*Ec. D.					
	15	42		IV.*Oc. R.		21	53		IV.*Tr. I.		22	18	44	I.*Ec. D.					
						23	18		I.*Sh. I.		22	40	14	IV.*Ec. R.					
9	0	2	47	I. Ec. D.		23	59		IV. Tr. E.		23	24		III.*Oc. R.					

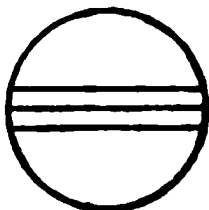
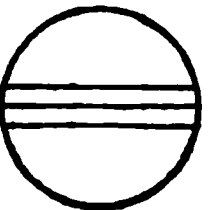
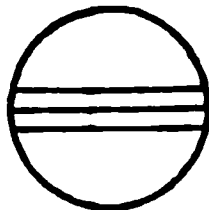
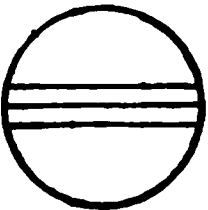
NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

*Visible at Washington.

GREENWICH MEAN TIME.

NOVEMBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

	III.	
	IV.	

Configurations at 18^h 30^m for an Inverting Telescope.

West.				East.			
	⁴ / ₃	.1	○	2.			
4.		.3 2.	○ 1.				
4.		.2	○	.3			.1 ●
.4		1.	○	.2 .3			
.4			○	³ / ₁ 3.			
	.4	2. 1.	○	3.			
		3..4	○	1.			.2 ●
	3.	.1	○ .4	2.			
		.3 2.	○ 1.	.4			
		.2	¹ / ₁ ○ .3		.4		
			○	.2 .3		.4	
			○	.12. 3.		.4	
		2. 1.	○	3.		4.	
		3. .2	○	.1		4.	
	3.	.1	○	⁴ / ₂			
	.3	² / ₁	○ .1				
	⁴ / ₂	.1	○				.3 ●
4.		1.	○ .2	.3			
4.			○ .1 2.	3.			
4.		2. 1.	○	3.			
.4		3. .2	○	.1			
.4	3.	1.	○	.2			
	.4.3		○	1.			
	.2	¹ / ₄	○				.3 ●
			○ 1..2.4	.3			
			○	2. ³ / ₄			.1 ●
		2. 1.	○	3.		.4	
		³ / ₂	○	.1		.4	
	3.	1.	○	.2		4.	
	.3		○ 2. 1.			4.	

GREENWICH MEAN TIME.

DECEMBER.																			
d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	3	5		I. Sh. I.	9	6	11		III. Oc. R.	17	22	29	26		I.*Ec. D.	25	21	54	I.*Tr. I.
		3	50	I. Tr. I.			16	3 25	II.*Ec. D.								23	59	I. Sh. E.
		5	20	I. Sh. E.			19	52	II.*Oc. R.	18	1	8		I. Oc. R.					
		6	4	I. Tr. E.			23	27	I.*Sh. I.			12	52	II.*Sh. I.	26	0	9		I. Tr. E.
		20	39 32	III.*Ec. D.								13	36	II.*Tr. I.			18	52 31	I.*Ec. D.
2	0	12	40		10	0	1		I. Tr. I.			15	34	II.*Sh. E.			21	18	I.*Oc. R.
		2	49	I. Ec. D.			1	42	I. Sh. E.			16	18	II.*Tr. E.			22	51	III.*Sh. I.
		3	13	III. Oc. R.			2	15	I. Tr. E.			19	50	I.*Sh. I.			23	26	III.*Tr. I.
		13	28 43	I. Oc. R.			20	35 12	I.*Ec. D.			20	11	I.*Tr. I.					
		17	36	II.*Ec. D.			23	24	I.*Oc. R.			22	4	I.*Sh. E.	27	2	1		III. Sh. E.
		21	34	II.*Oc. R.								22	25	I.*Tr. E.			2	36	III. Tr. E.
		22	16	I.*Sh. I.	11	10	16		II. Sh. I.								10	30 0	II. Ec. D.
		23	48	I.*Tr. I.			11	20	II. Tr. I.	19	16	58 5		I.*Ec. D.			13	27	II.*Oc. R.
				I. Sh. E.			12	58	II.*Sh. E.			18	52	III.*Sh. I.			16	12	I.*Sh. I.
3	0	31					14	2	II.*Tr. E.			19	34	I.*Oc. R.			16	20	I.*Tr. I.
		6	43	I. Tr. E.			15	11 22	IV.*Ec. D.			20	11	III.*Tr. I.			18	27	I.*Sh. E.
		8	24	IV. Sh. I.			16	57 47	IV.*Ec. R.			22	1	III.*Sh. E.			18	35	I.*Tr. E.
		13	4	IV. Sh. E.			17	56	I.*Sh. I.			23	21	III.*Tr. E.					
		15	13	IV.*Tr. I.			18	27	I.*Tr. I.						23	9	8 47		IV. Ec. D.
		18	41 7	IV.*Tr. E.			20	1	IV.*Oc. D.	20	0	38		IV. Sh. I.			12	19	IV.*Oc. R.
		21	39	I.*Ec. D.			20	10	I.*Sh. E.			2	37	IV. Sh. E.			13	21 7	I.*Ec. D.
				I.*Oc. R.			20	41	I.*Tr. E.			3	31	IV. Tr. I.			15	43	I.*Oc. R.
							22	10	IV.*Oc. R.			5	42	IV. Tr. E.					
4	7	41		II. Sh. I.								7	55 22	II. Ec. D.	29	4	47		II. Sh. I.
		9	4	II. Tr. I.	12	14	53		III.*Sh. I.			11	14	II. Oc. R.			4	58	II. Tr. I.
		10	21	II. Sh. E.			15	3 48	I.*Ec. D.			14	18	I.*Sh. I.			7	29	II. Sh. E.
		11	45	II. Tr. E.			16	53	III.*Tr. I.			14	36	I.*Tr. I.			7	40	II. Tr. E.
		16	2	I.*Sh. I.			17	50	I.*Oc. R.			16	33	I.*Sh. E.			10	41	I.*Sh. I.
		16	42	I.*Tr. I.			18	1	III.*Sh. E.			16	51	I.*Tr. E.			10	46	I.*Tr. I.
		18	17	I.*Sh. E.			20	4	III.*Tr. E.								12	56	I.*Sh. E.
		18	57	I.*Tr. E.						21	11	26 39		I.*Ec. D.			13	0	I.*Tr. E.
					13	5	20 46		II. Ec. D.			14 0		I.*Oc. R.					
5	10	55		III. Sh. I.			9 0		II. Oc. R.						30	7	49 47		I. Ec. D.
		13	9 41	I.*Ec. D.			12	24	I.*Sh. I.	22	2	10		II. Sh. I.			10	9	I. Oc. R.
		13	33	III.*Tr. I.			12	53	I.*Tr. I.			2	43	II. Tr. I.			12	37 0	III.*Ec. D.
		14	1	III.*Sh. E.			14	39	I.*Sh. E.			4	52	II. Sh. E.			16	2	III.*Oc. R.
		16	5	I.*Oc. R.			15	8	I.*Tr. E.			5	25	II. Tr. E.			23	47 19	II.*Ec. D.
		16	44	III.*Tr. E.								8	47	I. Sh. I.					
					14	9	32 20		I. Ec. D.			9	2	I. Tr. I.	31	2	33		II. Oc. R.
6	2	46 9		II. Ec. D.			12	16	I.*Oc. R.			11	1	I. Sh. E.			5	9	I. Sh. I.
		6	45	II. Oc. R.			23	34	II.*Sh. I.			11	17	I.*Tr. E.			5	12	I. Tr. I.
		10	31	I. Sh. I.													7	24	I. Sh. E.
		11	9	I. Tr. I.	15	0	28		II. Tr. I.	23	5	55 17		I. Ec. D.			7	26	I. Tr. E.
		12	45	I.*Sh. E.			2	16	II. Sh. E.			8	26	I. Oc. R.					
		13	23	I.*Tr. E.			3	10	II. Tr. E.			8	37 41	III. Ec. D.					
							6	53	I. Sh. I.			12	47	III.*Oc. R.					
7	7	38 10		I. Ec. D.			7	19	I. Tr. I.			21	12 40	II.*Ec. D.					
		10	30	I. Oc. R.			9	7	I. Sh. E.										
		20	58	II.*Sh. I.			9	33	I. Tr. E.	24	0	21		II. Oc. R.					
		22	12	II.*Tr. I.								3	15	I. Sh. I.					
		23	39	II.*Sh. E.	16	4	0 56		I. Ec. D.			3	28	I. Tr. I.					
							4	37 45	III. Ec. D.			5	30	I. Sh. E.					
8	0	53		II. Tr. E.			6	42	I. Oc. R.			5	43	I. Tr. E.					
		4	59	I. Sh. I.			9	29	III. Oc. R.										
		5	35	I. Tr. I.			18	38 3	II.*Ec. D.	25	0	23 50		I. Ec. D.					
		7	14	I. Sh. E.			22	7	II.*Oc. R.			2	52	I. Oc. R.					
		7	49	I. Tr. E.								15	29	II.*Sh. I.					
					17	1	21		I. Sh. I.			15	51	II.*Tr. I.					
9	0	38 34		III. Ec. D.			1	45	I. Tr. I.			18	11	II.*Sh. E.					
		2	6 44	I. Ec. D.			3	36	I. Sh. E.			18	33	II.*Tr. E.					
		4	58	I. Oc. R.			3	59	I. Tr. E.			21	44	I.*Sh. I.					

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

GREENWICH MEAN TIME.

DECEMBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

<div><div><div><div></div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div></div><div></div><div></div><div></div></div></div></div><div>d*</div></div>	III.	<div><div><div><div></div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div></div><div></div><div></div><div></div></div></div></div><div>d*</div></div>
<div><div><div><div></div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div></div><div></div><div></div><div></div></div></div></div><div>d</div></div>	IV.	<div><div><div><div></div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div></div><div></div><div></div><div></div></div></div></div><div>d*</div><div>r*</div></div>

Configurations at 17^h 45^m for an Inverting Telescope.

West.	East.
2. 1.3	4.
	21. 4.3
	4.1 2. 3
4. 2.	3.
4. 2. 3. 1	
4. 3. 1.	2.
4. 3.	2. 1
4. 2. 1.3	
4.	1. 3 2.
4. 1.	2. 3
2. 1. 4.	3.
2.	4. 1.
3. 1.	2. 4.
3.	1. 4.
2. 1.3	4.
1. 2 1.3	4.
1.	2. 3 4.
2. 1.	3. 4.
2. 3 4.	1.
3. 4. 1.	2.
4.3	12.
4. 3. 1.	
4. 2.	3. 1
4. 1.	2. 3
4.	1. 3.
4. 2.	1 3.
3. 4.	2.
3.	1. 4 2.
3 2. 1.	4.
2.	3. 1 4.
1.	2. 3 4.

660 . MAGNITUDE AND RINGS OF SATURN, 1918.

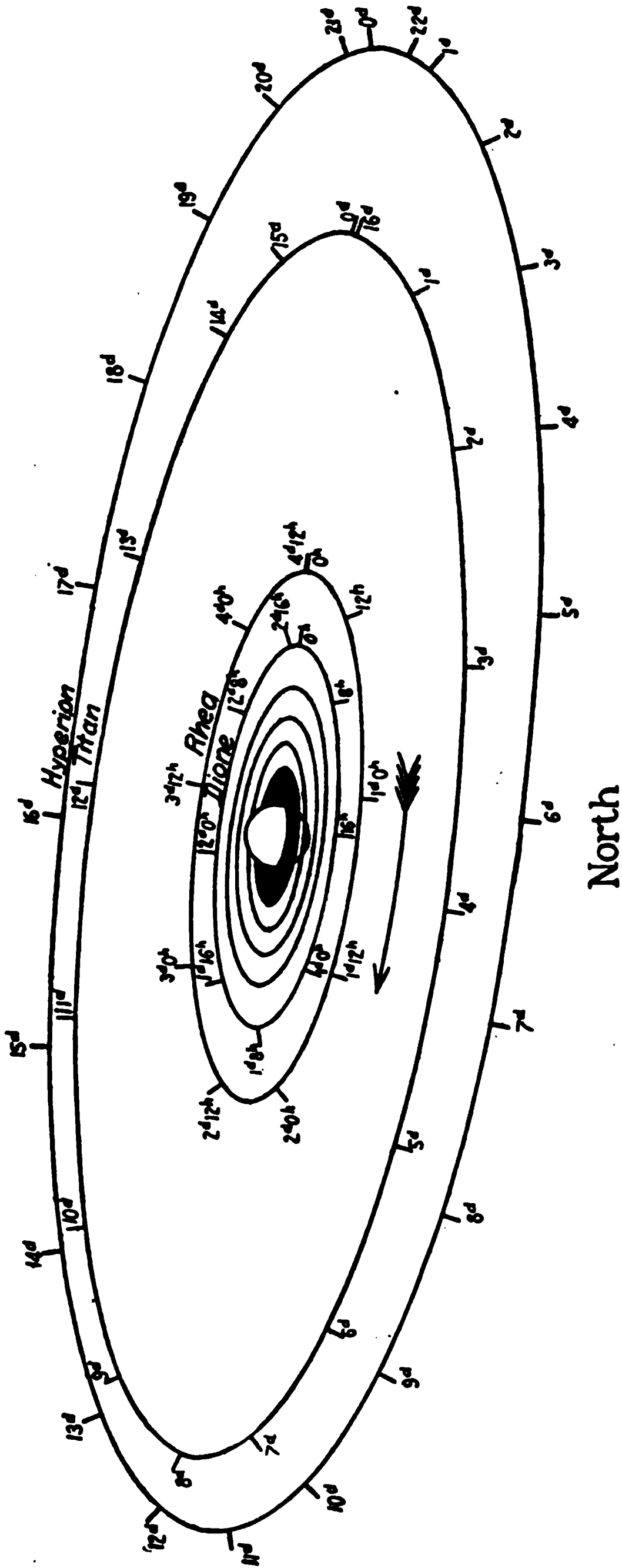
ELEMENTS FOR DETERMINING THE GEOCENTRIC POSITION, APPEARANCE.
AND MAGNITUDE OF SATURN'S RINGS.

Greenwich Mean Midnight.	<i>a</i>	<i>b</i>	<i>P</i>	<i>B</i>	<i>U</i>	<i>ω</i>	<i>B'</i>	<i>U'</i>
	"	"	° '	° '	° '	° '	° '	° '
Jan. 2	45.40	-12.87	-7 3.5	-16 26.4	10 54.7	42 21.7	-17 38.8	325 25.3
10	45.73	13.14	7 4.6	16 40.5	10 24.1	42 21.6	17 32.6	325 42.5
18	45.96	13.38	7 5.8	16 55.9	9 49.9	42 21.6	17 26.5	325 59.7
26	46.08	13.62	7 7.0	17 11.9	9 13.3	42 21.5	17 20.2	326 16.9
Feb. 3	46.08	13.85	7 8.2	17 28.1	8 35.8	42 21.5	17 14.0	326 34.1
11	45.98	-14.01	-7 9.4	-17 43.9	7 58.7	42 21.5	-17 7.7	326 51.3
19	45.76	14.13	7 10.4	17 58.6	7 23.5	42 21.5	17 1.5	327 8.4
27	45.45	14.20	7 11.2	18 11.8	6 51.2	42 21.4	16 55.3	327 25.5
Mar. 7	45.04	14.20	7 12.0	18 23.2	6 23.2	42 21.4	16 49.0	327 42.6
15	44.57	14.17	7 12.6	18 32.4	6 0.2	42 21.3	16 42.6	327 59.7
23	44.03	-14.08	-7 13.0	-18 39.1	5 43.2	42 21.3	-16 36.2	328 16.7
31	43.45	13.94	7 13.3	18 43.2	5 32.7	42 21.2	16 29.9	328 33.7
Apr. 8	42.85	13.76	7 13.4	18 44.7	5 28.8	42 21.2	16 23.5	328 50.7
16	42.23	13.55	7 13.3	18 43.4	5 31.7	42 21.1	16 17.1	329 7.7
24	41.61	13.31	7 13.0	18 39.5	5 41.4	42 21.1	16 10.7	329 24.6
May 2	41.01	-13.05	-7 12.6	-18 33.2	5 57.6	42 21.1	-16 4.2	329 41.5
10	40.41	12.76	7 12.0	18 24.4	6 20.0	42 21.1	15 57.7	329 58.4
18	39.86	12.46	7 11.3	18 13.3	6 48.2	42 21.0	15 51.2	330 15.3
26	39.35	12.16	7 10.4	17 59.9	7 21.8	42 21.0	15 44.8	330 32.1
June 3	38.88	11.85	7 9.2	17 44.6	8 0.1	42 20.9	15 38.3	330 48.9
11	38.45	-11.53	-7 8.0	-17 27.4	8 42.8	42 20.9	-15 31.7	331 5.7
19	38.06	11.21	7 6.5	17 8.5	9 29.3	42 20.9	15 25.1	331 22.5
27	37.73	10.90	7 4.8	16 48.1	10 19.0	42 20.9	15 18.5	331 39.3
July 5	37.45	10.59	7 2.9	16 26.3	11 11.3	42 20.8	15 11.9	331 56.0
13	37.22	10.30	7 0.9	16 3.5	12 5.8	42 20.8	15 5.3	332 12.7
21	37.05	-10.00	-6 58.8	-15 39.8	13 1.9	42 20.7	-14 58.7	332 29.4
29	36.94	9.72	6 56.5	15 15.4	13 59.1	42 20.7	14 52.0	332 46.0
Aug. 6	36.88	9.44	6 53.9	14 50.3	14 56.8	42 20.6	14 45.4	333 2.6
14	36.87	9.18	6 51.4	14 25.1	15 54.7	42 20.6	14 38.6	333 19.2
22	36.92	8.93	6 48.7	13 59.8	16 52.2	42 20.5	14 31.9	333 35.8
30	37.03	- 8.69	-6 46.0	-13 34.6	17 48.9	42 20.5	-14 25.2	333 52.4
Sept. 7	37.19	8.47	6 43.2	13 10.0	18 44.2	42 20.5	14 18.5	334 8.9
15	37.40	8.27	6 40.6	12 46.1	19 37.5	42 20.5	14 11.8	334 25.4
23	37.67	8.08	6 37.9	12 23.3	20 28.5	42 20.4	14 5.0	334 41.9
Oct. 1	38.00	7.92	6 35.2	12 1.6	21 16.5	42 20.4	13 58.2	334 58.4
9	38.38	- 7.78	-6 32.7	-11 41.5	22 1.2	42 20.3	-13 51.4	335 14.8
17	38.81	7.66	6 30.3	11 23.3	22 42.0	42 20.3	13 44.6	335 31.2
25	39.28	7.57	6 28.3	11 7.1	23 18.3	42 20.3	13 37.8	335 47.6
Nov. 2	39.80	7.52	6 26.4	10 53.5	23 49.8	42 20.3	13 31.0	336 4.0
10	40.35	7.50	6 24.9	10 42.5	24 16.0	42 20.2	13 24.1	336 20.4
18	40.92	- 7.51	-6 23.6	-10 34.3	24 36.5	42 20.2	-13 17.3	336 36.7
26	41.52	7.56	6 22.8	10 29.1	24 50.8	42 20.1	13 10.4	336 53.0
Dec. 4	42.13	7.65	6 22.4	10 27.1	24 58.7	42 20.1	13 3.5	337 9.3
12	42.73	7.77	6 22.3	10 28.4	25 0.2	42 20.0	12 56.6	337 25.5
20	43.32	7.92	6 22.7	10 32.8	24 55.1	42 20.0	12 49.7	337 41.8
28	43.87	- 8.11	-6 23.4	-10 40.3	24 43.9	42 20.0	-12 42.8	337 58.0

The factor to be multiplied by *a* and *b* to obtain the axes of—
The inner ellipse of the outer ring=0.8801, log factor=9.9445
The outer ellipse of the inner ring=0.8599, log factor=9.9344
The inner ellipse of the inner ring=0.6650, log factor=9.8228
The inner ellipse of the dusky ring=0.5486, log factor=9.7392

NOTE.—The negative sign of *B* indicates that the visible surface of the rings is the southern one.

South



Names of the Satellites.

- I. Mimas.
- II. Enceladus.
- III. Tethys.
- IV. Dione.
- V. Rhea.
- VI. Titan.
- VII. Hyperion.
- VIII. Iapetus.
- IX. Phoebe.

Mean Synodic Periods.

	d	h
I.	0	22.6
II.	1	8.9
III.	1	21.3
IV.	2	17.7
V.	4	12.5
VI.	15	23.3
VII.	21	7.6
VIII.	79	22.1
IX.	523	15.6

Apparent Orbits of the Seven Inner Satellites of Saturn,

at Date of Opposition, January 31, 1918,

as seen in an inverting telescope.

GREENWICH MEAN TIME.

In the diagram on the preceding page, the points of the orbits marked "0" are those of the eastern elongation, as seen in an inverting telescope. The times of these elongations may be found from the following tables, and the apparent position of a satellite at any other time may be marked on the diagram by setting off on the proper orbit the elapsed interval in days and hours since the last eastern elongation. The orbits of the five inner satellites are regarded as circular, and the time of any greatest elongation not given in the tables may be readily found from those given by adding or subtracting the proper multiple of the mean synodic period. For Titan, Hyperion, and Iapetus the eccentricity is taken into account, and for Iapetus the times both of the greatest elongations and of the conjunctions are given. The following abbreviations are used in the tables:

E., Eastern Elongation.
W., Western Elongation.

I., Inferior Conjunction (north of planet).
S., Superior Conjunction (south of planet).

MIMAS.

Greatest Elongations Visible in the United States.

Jan.	d h 1 1.8 W. 1 13.1 E. 2 0.4 W. 2 23.0 W. 3 21.7 W. 4 20.3 W. 5 18.9 W. 6 17.5 W. 7 16.1 W. 8 14.7 W. 9 2.0 E. 9 13.3 W. 10 0.6 E. 10 23.3 E. 11 21.9 E. 12 20.5 E. 13 19.1 E. 14 17.7 E. 15 16.3 E. 16 14.9 E. 17 2.2 W. 17 13.5 E. 18 0.8 W. 18 12.1 E. 18 23.4 W. 19 22.1 W. 20 20.7 W. 21 19.3 W. 22 17.9 W. 23 16.5 W. 24 15.1 W. 25 2.4 E. 25 13.7 W. 26 1.0 E. 26 12.3 W. 26 23.7 E. 27 22.3 E. 28 20.9 E.	Jan.	d h 29 19.5 E. 30 18.1 E. 31 16.7 E. Feb. 1 15.3 E. 2 13.9 E. 3 1.2 W. 3 12.5 E. 3 23.9 W. 4 11.2 E. 4 22.5 W. 5 21.1 W. 6 19.7 W. 7 18.3 W. 8 16.9 W. 9 15.5 W. 10 14.1 W. 11 1.4 E. 11 12.8 W. 12 0.1 E. 12 11.4 W. 12 22.7 E. 13 21.3 E. 14 19.9 E. 15 18.5 E. 16 17.1 E. 17 15.7 E. 18 14.3 E. 19 12.9 E. 20 0.3 W. 20 11.6 E. 20 22.9 W. 21 21.5 W. 22 20.1 W. 23 18.8 W. 24 17.4 W. 25 16.0 W. 26 14.6 W. 27 13.2 W.	Feb.	d h 28 0.5 E. 28 11.9 W. 28 23.2 E. Mar. 1 21.8 E. 2 20.4 E. 3 19.0 E. 4 17.6 E. 5 16.2 E. 6 14.8 E. 7 13.4 E. 8 12.1 E. 8 23.4 W. 9 22.0 W. 10 20.6 W. 11 19.2 W. 12 17.9 W. 13 16.5 W. 14 15.1 W. 15 13.7 W. 16 12.3 W. 16 23.7 E. 17 22.3 E. 18 20.9 E. 19 19.5 E. 20 18.1 E. 21 16.7 E. 22 15.3 E. 23 13.9 E. 24 12.6 E. 25 22.5 W. 26 21.1 W. 27 19.7 W. 28 18.4 W. 29 17.0 W. 30 15.6 W. 31 14.2 W. Apr. 1 12.8 W. 3 21.4 E.	Apr.	d h 4 20.0 E. 5 18.6 E. 6 17.2 E. 7 15.8 E. 8 14.4 E. 9 13.1 E. 11 21.6 W. 12 20.3 W. 13 18.9 W. 14 17.5 W. 15 16.1 W. 16 14.7 W. 17 13.4 W. 20 20.5 E. 21 19.1 E. 22 17.7 E. 23 16.4 E. 24 15.0 E. 25 13.6 E. 28 20.8 W. 29 19.4 W. 30 18.1 W. May 1 16.7 W. 2 15.3 W. 3 13.9 W. 4 12.6 W. 7 19.7 E. 8 18.3 E. 9 17.0 E. 10 15.6 E. 11 14.2 E. 12 12.8 E. 16 18.7 W. 17 17.3 W. 18 15.9 W. 19 14.5 W. 20 13.2 W. 24 18.9 E.	May	d h 25 17.6 E. 26 16.2 E. 27 14.8 E. 28 13.4 E. ... Oct. 16 0.5 E. 16 23.2 E. 17 21.8 E. 18 20.4 E. 19 19.0 E. 24 0.8 W. 24 23.5 W. 25 22.1 W. 26 20.7 W. 27 19.3 W. Nov. 1 1.1 E. 1 23.7 E. 2 22.3 E. 3 21.0 E. 4 19.6 E. 5 18.2 E. 9 1.4 W. 10 0.0 W. 10 22.6 W. 11 21.2 W. 12 19.9 W. 13 18.5 W. 17 1.6 E. 18 0.2 E. 18 22.8 E. 19 21.5 E. 20 20.1 E. 21 18.7 E. 22 17.3 E. 25 1.9 W. 26 0.5 W. 26 23.1 W.	Nov.	d h 27 21.7 W. 28 20.4 W. 29 19.0 W. 30 17.6 W. Dec. 1 16.2 W. 3 2.1 E. 4 0.7 E. 4 23.3 E. 5 22.0 E. 6 20.6 E. 7 19.2 E. 8 17.8 E. 9 16.5 E. 11 2.4 W. 12 1.0 W. 12 23.6 W. 13 22.2 W. 14 20.9 W. 15 19.5 W. 16 18.1 W. 17 16.7 W. 18 15.3 W. 19 2.6 E. 20 1.2 E. 20 23.8 E. 21 22.5 E. 22 21.1 E. 23 19.7 E. 24 18.3 E. 25 16.9 E. 26 15.5 E. 28 1.4 W. 29 0.0 W. 29 22.7 W. 30 21.3 W. 31 19.9 W.
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MEAN TIME.

ENCELADUS.

a.	d h	Feb.	d h	Mar.	d h	May	d h	Oct.	d h	Nov.	d h
1	20.8 E.	10	14.3 E.	23	7.9 E.	1	1.6 E.	18	1.0 E.	26	18.7 E.
3	5.7 E.	11	23.2 E.	23	16.8 E.	2	10.5 E.	19	9.9 E.	28	3.6 E.
4	14.6 E.	13	8.0 E.	25	1.6 E.	3	19.4 E.	20	18.8 E.	29	12.5 E.
5	23.5 E.	14	16.9 E.	26	10.5 E.	5	4.3 E.	22	3.7 E.	30	21.4 E.
7	8.3 E.	16	1.8 E.	27	19.4 E.	6	13.2 E.	23	12.6 E.	Dec. 2	6.3 E.
8	17.2 E.	17	10.7 E.	29	4.3 E.	7	22.1 E.	24	21.4 E.	3	15.2 E.
10	2.1 E.	18	19.6 E.	30	13.2 E.	9	7.0 E.	26	6.3 E.	5	0.1 E.
11	11.0 E.	20	4.5 E.	31	22.1 E.	10	15.9 E.	27	15.2 E.	6	8.9 E.
12	19.9 E.	21	13.3 E.	Apr. 2	6.9 E.	12	0.8 E.	29	0.1 E.	7	17.8 E.
14	4.8 E.	22	22.2 E.	3	15.8 E.	13	9.7 E.	30	9.0 E.	9	2.7 E.
15	13.7 E.	24	7.1 E.	5	0.7 E.	14	18.6 E.	Nov. 31	17.9 E.	10	11.6 E.
16	22.6 E.	25	16.0 E.	6	9.6 E.	16	3.4 E.	2	2.8 E.	11	20.5 E.
18	7.4 E.	27	0.9 E.	7	18.5 E.	17	12.3 E.	3	11.7 E.	13	5.4 E.
19	16.3 E.	28	9.8 E.	9	3.4 E.	18	21.2 E.	4	20.6 E.	14	14.2 E.
21	1.2 E.	Mar. 1	18.6 E.	10	12.3 E.	20	6.1 E.	6	5.5 E.	15	23.1 E.
22	10.1 E.	3	3.5 E.	11	21.2 E.	21	15.0 E.	7	14.4 E.	17	8.0 E.
23	19.0 E.	4	12.4 E.	13	6.1 E.	22	23.9 E.	8	23.2 E.	18	16.9 E.
25	3.9 E.	5	21.3 E.	14	14.9 E.	24	8.8 E.	10	8.1 E.	20	1.8 E.
26	12.8 E.	7	6.2 E.	15	23.8 E.	25	17.7 E.	11	17.0 E.	21	10.7 E.
27	21.7 E.	8	15.0 E.	17	8.7 E.	27	2.6 E.	13	1.9 E.	22	19.5 E.
29	6.5 E.	9	23.9 E.	18	17.6 E.	28	11.5 E.	14	10.8 E.	24	4.4 E.
30	15.3 E.	11	8.8 E.	20	2.5 E.	29	20.4 E.	15	19.6 E.	25	13.3 E.
b. 1	0.2 E.	12	17.7 E.	21	11.4 E.	31	5.3 E.	17	4.5 E.	Nov. 30	11.1 E.
2	9.0 E.	14	2.6 E.	22	20.3 E.	June 1	14.2 E.	18	13.4 E.	28	7.1 E.
3	17.9 E.	15	11.5 E.	24	5.2 E.	...	...	19	22.3 E.	29	16.0 E.
5	2.8 E.	16	20.3 E.	25	14.1 E.	Oct. 1	22.3 E.	21	7.2 E.	31	0.8 E.
6	11.7 E.	18	5.2 E.	26	23.0 E.	15	7.2 E.	22	16.1 E.		
7	20.5 E.	19	14.1 E.	28	7.9 E.	16	16.1 E.	24	0.9 E.		
9	5.4 E.	20	23.0 E.	29	16.8 E.			25	9.8 E.		

TETHYS.

a.	d h	Feb.	d h	Mar.	d h	May	d h	Oct.	d h	Nov.	d h
1	211.7 E.	11	2.7 E.	22	18.0 E.	1	9.5 E.	18	9.4 E.	27	1.0 E.
4	9.0 E.	13	0.0 E.	24	15.3 E.	3	6.8 E.	20	6.7 E.	28	22.3 E.
6	6.3 E.	14	21.3 E.	26	12.6 E.	5	4.2 E.	22	4.0 E.	30	19.6 E.
8	3.5 E.	16	18.6 E.	28	9.9 E.	7	1.5 E.	24	1.3 E.	Dec. 2	16.9 E.
10	0.8 E.	18	15.9 E.	30	7.2 E.	8	22.8 E.	26	22.6 E.	4	14.2 E.
11	22.1 E.	20	13.2 E.	Apr. 1	4.5 E.	10	20.1 E.	27	20.0 E.	6	11.5 E.
13	19.4 E.	22	10.5 E.	3	1.8 E.	12	17.5 E.	29	17.3 E.	8	8.8 E.
15	16.7 E.	24	7.8 E.	4	23.1 E.	14	14.8 E.	31	14.6 E.	10	6.1 E.
17	14.0 E.	26	5.1 E.	6	20.4 E.	16	12.1 E.	Nov. 2	11.9 E.	12	3.4 E.
19	11.3 E.	28	2.4 E.	8	17.7 E.	18	9.4 E.	4	9.3 E.	14	0.7 E.
21	8.6 E.	Mar. 1	23.7 E.	10	15.0 E.	20	6.8 E.	6	6.6 E.	15	22.0 E.
23	5.9 E.	3	21.0 E.	12	12.3 E.	22	4.1 E.	8	3.9 E.	17	19.4 E.
25	3.1 E.	5	18.3 E.	14	9.7 E.	24	1.4 E.	10	1.2 E.	19	16.7 E.
27	0.4 E.	7	15.6 E.	16	7.0 E.	25	22.7 E.	11	22.6 E.	21	14.0 E.
28	21.7 E.	9	12.9 E.	18	4.3 E.	27	20.1 E.	13	19.9 E.	23	11.3 E.
30	19.0 E.	11	10.2 E.	20	1.6 E.	29	17.4 E.	15	17.2 E.	25	8.6 E.
b. 1	16.3 E.	13	7.5 E.	21	22.9 E.	31	14.7 E.	17	14.5 E.	27	5.9 E.
3	13.6 E.	15	4.8 E.	23	20.2 E.	...	...	19	11.8 E.	29	3.2 E.
5	10.9 E.	17	2.1 E.	25	17.6 E.	Oct. 1	14.7 E.	21	9.1 E.	31	0.6 E.
7	8.2 E.	18	23.4 E.	27	14.9 E.			23	6.4 E.		
9	5.4 E.	20	20.7 E.	29	12.2 E.	16	12.0 E.	25	3.7 E.		

GREENWICH MEAN TIME.

DIONE.

	d	h		d	h		d	h		d	h		d	h			
Jan.	3	2.9 E.	Feb.	13	3.7 E.	Mar.	26	4.7 E.	May	6	6.1 E.	Oct.	23	1.7 E.	Dec.	3	3.3 E.
	5	20.6 E.		15	21.3 E.		28	22.3 E.		8	23.8 E.		25	19.5 E.		5	21.0 E.
	8	14.2 E.		18	14.9 E.		31	16.0 E.		11	17.5 E.		28	13.2 E.		8	14.7 E.
	11	7.9 E.		21	8.6 E.		3	9.6 E.		14	11.2 E.		31	6.9 E.		11	8.3 E.
	14	1.5 E.		24	2.2 E.		6	3.3 E.		17	5.0 E.		Nov.	3		0.6 E.	14	2.0 E.
	16	19.2 E.	Mar.	26	19.9 E.		8	21.0 E.		19	22.7 E.		5	18.3 E.		16	19.7 E.
	19	12.8 E.		1	13.5 E.		11	14.7 E.		22	16.4 E.		8	12.0 E.		19	13.4 E.
	22	6.5 E.		4	7.2 E.		14	8.4 E.		25	10.1 E.		11	5.7 E.		22	7.1 E.
	25	0.1 E.		7	0.9 E.		17	2.1 E.		28	3.8 E.		13	23.4 E.		25	0.7 E.
	27	17.8 E.		9	18.6 E.		19	19.8 E.		30	21.6 E.		16	17.1 E.		27	18.4 E.
Feb.	30	11.4 E.		12	12.3 E.		22	13.5 E.	Oct.	...	...		19	10.8 E.		30	12.0 E.
	2	5.1 E.		15	5.9 E.		25	7.2 E.		...	...		22	4.5 E.			
	4	22.7 E.		17	23.6 E.		28	0.9 E.		14	20.6 E.		24	22.2 E.			
	7	16.4 E.		20	17.3 E.		30	18.6 E.		17	14.3 E.		27	15.9 E.			
	10	10.0 E.		23	11.0 E.		3	12.4 E.		20	8.0 E.		30	9.6 E.			

RHEA.

Jan.	d h 5 2.4 E. 9 14.8 E. 14 3.1 E. 18 15.4 E. 23 3.7 E.	Feb.	d h 14 17.3 E. 19 5.7 E. 23 18.0 E. 28 6.3 E.	Mar.	d h 27 8.5 E. 31 20.9 E.	May	d h 7 0.5 E. 11 13.0 E. 16 1.5 E. 20 14.0 E. 25 2.6 E.	Oct.	d h 21 9.2 E. 25 21.7 E. 30 10.2 E.	Dec.	d h 1 1.4 E. 5 13.9 E. 10 2.3 E. 14 14.7 E. 19 3.1 E.
	27 16.0 E.	Mar.	4 18.6 E.		14 10.2 E.		29 15.1 E.		12 23.7 E.		23 15.5 E.
Feb.	1 4.3 E. 5 16.7 E. 10 5.0 E.		9 7.0 E. 13 19.3 E. 18 7.7 E. 22 20.1 E.		18 22.6 E. 23 11.1 E. 27 23.5 E.	Oct.	16 20.7 E.		17 12.1 E. 22 0.6 E. 26 13.0 E.		28 3.9 E. 32 16.3 E.
		May	2 12.0 E.								

TITAN.

Jan.	d h 1 10.1 W. 9 15.1 E. 17 7.6 W. 25 12.6 E.	Feb.	d h 18 2.4 W. 26 7.5 E.	Apr.	d h 6 20.3 W. 15 2.2 E. 22 19.2 W.	May	d h 24 18.4 W. June 2 0.8 E.	Oct.	d h 31 23.4 W. Nov. 9 4.6 E. 16 22.9 W. 25 3.9 E.	Dec.	d h 18 20.7 W. 27 1.2 E.
Feb.	2 5.0 W. 10 10.0 E.	Mar.	5 23.9 W. 14 5.3 E. 21 21.9 W. 30 3.5 E.	May	1 1.3 E. 8 18.6 W. 17 0.9 E.	Oct.	15 23.4 W. 24 4.9 E.	Dec.	2 22.1 W. 11 2.7 E.		

HYPERION.

	d	h		d	h		d	h		d	h		d	h			
Jan.	3	4.9 E.	Feb.	14	18.6 E.	Mar.	29	8.9 E.	May	11	2.1 E.	Oct.	18	15.2 W.	Nov.	30	1.0 W.
	14	14.9 W.		26	4.4 W.	Apr.	9	18.6 W.		22	10.6 W.		29	1.8 E.	Dec.	10	12.7 E.
	24	11.9 E.	Mar.	8	1.4 E.		19	17.1 E.	June	1	11.5 E.	Nov.	8	20.5 W.		21	4.8 W.
Feb.	4	21.7 W.		19	11.3 W.	May	1	2.4 W.		.....		19	7.8 E.		31	16.6 E.	

IAPETUS.

Jan.	d h 4 18.2 W. 24 6.2 S.	Feb.	d h 13 18.6 E. Mar. 5 8.9 I.	Mar.	d h 24 0.8 W. Apr. 12 17.1 S.	May	d h 3 16.9 E. 23 20.3 I.	Nov.	d h 2 1.4 I. 21 2.5 W.	Dec.	d h 11 5.8 S. 31 23.7 E.
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DIFFERENTIAL COORDINATES OF PHOEBE.

FOR

MEAN NOON.

FROM

Time from Eastern Elongation.	Mimas.		Time from Eastern Elongation.	Enceladus.		Tethys.		Time from Eastern Elongation.	Dione.	
	p^1	F		p^1	F	p^1	F		p^1	F
h	°		d h	°		°		d h	°	
0.0	83.0	1.000	0 0	83.0	1.000	83.0	1.000	0 0	83.0	1.000
0.5	80.6	0.991	0 1	79.7	0.983	80.5	0.991	0 2	79.7	0.983
1.0	78.2	0.965	0 2	76.2	0.935	77.9	0.966	0 4	76.2	0.934
1.5	75.6	0.922	0 3	72.1	0.856	75.2	0.923	0 6	72.1	0.855
2.0	72.7	0.864	0 4	67.0	0.751	72.1	0.866	0 8	67.0	0.750
2.5	69.2	0.791	0 5	60.1	0.627	68.5	0.794	0 10	60.1	0.626
3.0	65.1	0.707	0 6	49.5	0.494	64.1	0.712	0 12	49.5	0.492
3.5	59.7	0.614	0 7	31.5	0.371	58.6	0.620	0 14	31.4	0.370
4.0	52.3	0.516	0 8	1.1	0.301	51.0	0.525	0 16	0.7	0.300
4.5	41.5	0.421	0 9	326.4	0.331	40.1	0.433	0 18	325.9	0.331
5.0	25.0	0.341	0 10	303.2	0.436	23.9	0.356	0 20	302.9	0.437
5.5	1.3	0.297	0 11	290.0	0.568	1.3	0.314	0 22	289.7	0.570
6.0	334.9	0.308	0 12	281.7	0.698	336.2	0.323	1 0	281.6	0.700
6.5	313.8	0.369	0 13	276.0	0.812	315.8	0.380	1 2	275.9	0.814
7.0	299.8	0.456	0 14	271.6	0.903	301.7	0.464	1 4	271.5	0.904
7.5	290.6	0.553	0 15	267.8	0.966	292.1	0.558	1 6	267.7	0.966
8.0	284.1	0.649	0 16	264.5	0.997	285.3	0.653	1 8	264.4	0.997
8.5	279.2	0.740	0 17	261.2	0.995	280.2	0.741	1 10	261.1	0.994
9.0	275.4	0.820	0 18	257.8	0.960	276.2	0.821	1 12	257.7	0.959
9.5	272.2	0.888	0 19	254.0	0.894	272.8	0.887	1 14	253.9	0.892
10.0	269.4	0.940	0 20	249.4	0.800	269.8	0.940	1 16	249.3	0.797
10.5	266.8	0.977	0 21	243.5	0.684	267.2	0.976	1 18	243.3	0.680
11.0	264.4	0.996	0 22	234.8	0.553	264.6	0.996	1 20	234.6	0.549
11.5	262.1	0.999	0 23	220.8	0.422	262.1	0.999	1 22	220.3	0.418
12.0	259.7	0.983	1 0	196.1	0.322	259.6	0.984	2 0	195.2	0.319
12.5	257.2	0.951	1 1	160.9	0.305	257.0	0.953	2 2	159.7	0.305
13.0	254.5	0.902	1 2	131.9	0.384	254.2	0.905	2 4	131.0	0.387
13.5	251.4	0.838	1 3	115.0	0.509	250.9	0.843	2 6	114.5	0.513
14.0	247.8	0.760	1 4	105.0	0.642	247.1	0.767	2 8	104.6	0.646
14.5	243.2	0.672	1 5	98.3	0.764	242.4	0.681	2 10	98.1	0.768
15.0	237.2	0.576	1 6	93.4	0.866	236.2	0.588	2 12	93.2	0.869
15.5	228.7	0.479	1 7	89.4	0.942	227.7	0.492	2 14	89.3	0.944
16.0	216.0	0.388	1 8	85.9	0.987	215.2	0.404	2 16	85.8	0.988
16.5	196.7	0.318	1 9	82.6	1.000	196.7	0.337	2 18	82.5	1.000
17.0	171.0	0.294	1 10			172.5	0.311			
17.5	146.0	0.326	1 11			148.4	0.338			
18.0	127.8	0.400	1 12			130.2	0.407			
18.5	115.9	0.493	1 13			117.9	0.496			
19.0	107.8	0.591	1 14			109.5	0.591			
19.5	102.1	0.685	1 15			103.4	0.684			
20.0	97.7	0.772	1 16			98.7	0.770			
20.5	94.1	0.848	1 17			94.9	0.845			
21.0	91.1	0.910	1 18			91.7	0.907			
21.5	88.4	0.956	1 19			88.9	0.954			
22.0	85.9	0.986	1 20			86.3	0.985			
22.5	83.6	0.997	1 21			83.7	0.999			
23.0	81.2	0.995	1 22			81.3	0.996			

Position angle of satellite $p = p^1 + (P - P_0)$.

Apparent distance of satellite $s = F \frac{a(\rho)}{\rho}$.

FOR

MEAN MIDNIGHT.

SATELLITES OF URANUS, 1918.

APPARENT ORBITS OF THE SATELLITES OF URANUS AT DATE OF OPPOSITION,
AUGUST 19, 1918, AS SEEN IN AN INVERTING TELESCOPE.

South

Apparent Apocides.

Date.	Position Angle.	App. Distances.	
		Ariel.	Umbriel.
May 10	348.5	13.2	18.3
Aug. 18	348.9	13.9	19.4
Nov. 26	349.4	13.1	18.3

Apparent Apocides.

Date.	Position Angle.	App. Distances.	
		Titania.	Oberon.
May 10	348.5	40.1	40.1
Aug. 18	348.9	42.6	42.6
Nov. 26	349.4	40.1	40.1

North

GREENWICH MEAN TIME OF GREATEST ELONGATION.

ARIEL.		UMBRIEL.		TITANIA.		OBERON.
North.	South.	North.	South.	North.	South.	North and South.
May 11 19.2	May 15 14.0	May 3 17.6	May 5 19.3	Apr. 30 9.1	May 4 17.5	May 20 17.5 S.
19 8.7	23 3.4	12 0.5	14 2.2	May 9 2.0	13 10.4	27 11.1 N.
26 22.1	30 16.9	20 7.4	22 9.1	17 18.9	22 3.4	June 3 4.7 S.
June 3 11.6	June 7 6.3	28 14.3	30 16.0	28 11.8	30 20.3	9 22.2 N.
11 1.0	14 19.8	June 5 21.2	June 7 22.9	June 4 4.7	June 8 18.2	16 15.8 S.
18 14.5	22 9.2	14 4.1	16 5.8	12 21.7	17 6.1	23 9.3 N.
26 4.0	29 22.7	22 11.0	24 12.8	21 14.6	25 23.1	30 2.9 S.
July 3 17.4	July 7 12.1	30 17.9	July 2 19.7	30 7.5	July 4 16.0	July 6 20.5 N.
11 6.9	15 1.6	July 9 0.8	11 2.6	July 9 0.5	13 9.0	13 14.1 S.
18 20.3	22 15.1	17 7.8	19 9.5	17 17.4	22 1.9	20 7.6 N.
26 9.8	30 4.5	25 14.7	27 16.4	26 10.4	30 18.9	27 1.2 S.
Aug. 2 23.3	Aug. 6 18.0	Aug. 2 21.6	Aug. 4 23.3	Aug. 4 3.4	Aug. 8 11.8	Aug. 2 18.8 N.
10 12.7	14 7.5	11 4.5	13 6.3	12 20.4	17 4.8	9 12.4 S.
18 2.2	21 21.0	19 11.5	21 13.2	21 13.3	25 21.8	16 6.0 N.
25 15.7	29 10.4	27 18.4	29 20.2	30 6.3	Sept. 3 14.8	22 23.6 S.
Sept. 2 5.2	Sept. 5 23.9	Sept. 5 1.4	Sept. 7 3.1	Sept. 7 23.3	12 7.7	29 17.2 N.
9 18.6	13 13.4	13 8.3	15 10.0	16 16.2	21 0.7	Sept. 5 10.8 S.
17 8.1	21 2.9	21 15.2	23 17.0	25 9.2	29 17.7	12 4.4 N.
24 21.6	28 16.4	29 22.2	Oct. 1 23.9	Oct. 4 2.2	Oct. 8 10.7	18 22.0 S.
Oct. 2 11.1	Oct. 6 5.8	Oct. 8 5.1	10 6.9	12 19.2	17 3.6	25 15.6 N.
10 0.6	13 19.3	16 12.1	18 13.8	21 12.1	25 20.6	Oct. 2 9.2 S.
17 14.1	21 8.8	24 19.0	26 20.7	30 5.1	Nov. 3 13.6	9 2.8 N.
25 3.6	28 22.3	Nov. 2 2.0	Nov. 4 3.7	Nov. 7 22.1	12 6.5	15 20.4 S.
Nov. 1 17.0	Nov. 5 11.8	10 8.9	12 10.6	16 15.0	20 23.5	22 14.0 N.
9 6.5	13 1.3	18 15.8	20 17.6	25 8.0	29 16.4	29 7.5 S.

In the above diagram the central circle represents the planet.

For Ariel every third greatest elongation is given, and for Umbriel every alternate one; the intermediate ones may be found by adding multiples of the period of the satellite.

Sidereal period of Ariel, $2^d 12^h.489$; of Umbriel, $4^d 3^h.460$; of Titania, $8^d 16^h.941$; of Oberon, $13^d 11^h.118$.

SATELLITES OF URANUS, 1918.

FOR GREENWICH MEAN NOON.

Date.	P-P ₀ .	$\frac{a(\rho)}{\rho}$				Date.	P-P ₀ .	$\frac{a(\rho)}{\rho}$			
		Ariel.	Umbriel.	Titania.	Oberon.			Ariel.	Umbriel.	Titania.	Oberon.
	°	"	"	"	"		°	"	"	"	"
Apr. 20	-0.4	12.9	18.0	29.6	39.6	Aug. 18	0.0	13.9	19.4	31.8	42.6
25	0.4	13.0	18.1	29.7	39.7	23	0.0	13.9	19.4	31.8	42.6
30	0.5	13.0	18.2	29.8	39.8	28	+0.1	13.9	19.4	31.8	42.5
May 5	0.5	13.1	18.2	29.9	40.0	Sept. 2	0.2	13.9	19.4	31.8	42.5
10	0.5	13.1	18.3	30.0	40.2	7	0.2	13.9	19.3	31.7	42.4
15	-0.5	13.2	18.4	30.2	40.3	12	+0.3	13.9	19.3	31.7	42.4
20	0.5	13.2	18.5	30.3	40.5	17	0.3	13.8	19.3	31.6	42.3
25	0.6	13.3	18.5	30.4	40.7	22	0.4	13.8	19.2	31.5	42.2
30	0.6	13.4	18.6	30.5	40.8	27	0.4	13.8	19.2	31.4	42.0
June 4	0.6	13.4	18.7	30.7	41.0	Oct. 2	0.4	13.7	19.1	31.3	41.9
9	-0.6	13.5	18.8	30.8	41.2	7	+0.5	13.7	19.0	31.2	41.8
14	0.5	13.5	18.8	30.9	41.3	12	0.5	13.6	19.0	31.1	41.6
19	0.5	13.6	18.9	31.0	41.5	17	0.5	13.6	18.9	31.0	41.5
24	0.5	13.6	19.0	31.1	41.6	22	0.6	13.5	18.8	30.9	41.3
29	0.5	13.7	19.0	31.2	41.8	27	0.6	13.5	18.8	30.8	41.2
July 4	-0.5	13.7	19.1	31.3	41.9	Nov. 1	+0.6	13.4	18.7	30.7	41.0
9	0.4	13.8	19.2	31.4	42.0	6	0.6	13.4	18.6	30.5	40.8
14	0.4	13.8	19.2	31.5	42.2	11	0.6	13.3	18.5	30.4	40.6
19	0.3	13.8	19.3	31.6	42.3	16	0.5	13.2	18.4	30.2	40.5
24	0.3	13.8	19.3	31.6	42.3	21	0.5	13.2	18.4	30.1	40.3
29	-0.2	13.9	19.3	31.7	42.4	26	+0.5	13.1	18.3	30.0	40.1
Aug. 3	0.2	13.9	19.4	31.8	42.5	Dec. 1	0.5	13.1	18.2	29.9	40.0
8	0.1	13.9	19.4	31.8	42.5	6	0.4	13.0	18.1	29.8	39.8
13	-0.1	13.9	19.4	31.8	42.5	11	+0.4	13.0	18.1	29.6	39.6

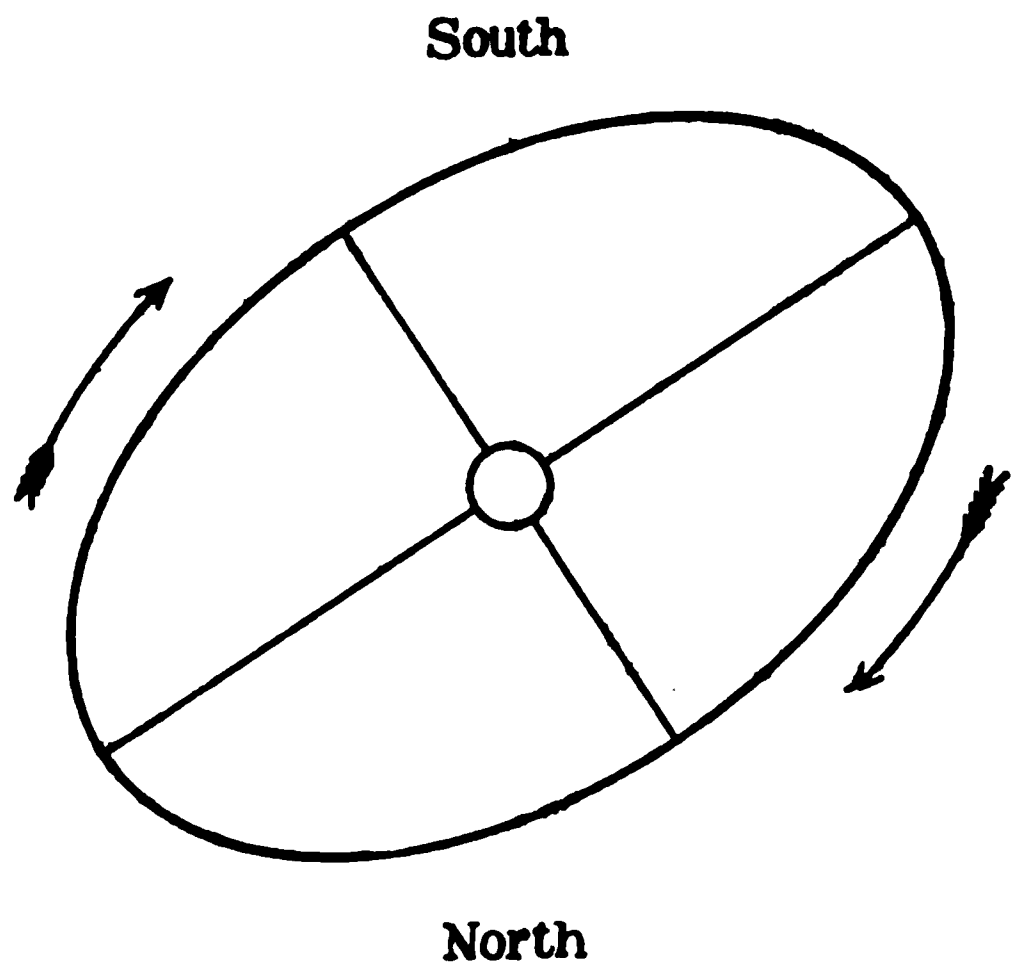
SATELLITE OF NEPTUNE, 1918.

Time from Eastern Elongation.			F	Time from Eastern Elongation.			F	Date.	P-P ₀ .	$\frac{a(\rho)}{\rho}$	Date.	P-P ₀ .	$\frac{a(\rho)}{\rho}$	
d	h	p ¹		d	h	p ¹		Date.	P-P ₀ .	$\frac{a(\rho)}{\rho}$	Date.	P-P ₀ .	$\frac{a(\rho)}{\rho}$	
0	0	122.5	1.000	3	0	300.1	0.999	Jan. 1	+0.8	16.7	May 1	-1.5	16.2	
0	3	117.7	0.994	3	3	295.3	0.988	6	0.6	16.8	6	1.4	16.2	
0	6	112.8	0.979	3	6	290.3	0.967	11	0.5	16.8	11	1.4	16.1	
0	9	107.6	0.953	3	9	285.0	0.936	16	0.3	16.8	16	1.3	16.1	
0	12	102.2	0.918	3	12	279.3	0.898	21	0.2	16.8	21	-1.2	16.0	
0	15	96.2	0.876	3	15	273.0	0.853	26	+0.0	16.8	Oct. 3	+3.3	16.0	
0	18	89.6	0.828	3	18	266.0	0.804	31	-0.1	16.8		8	3.4	16.0
0	21	82.2	0.779	3	21	258.1	0.754	Feb. 5	0.3	16.8		13	3.5	16.1
1	0	73.7	0.730	4	0	249.1	0.707	10	0.5	16.8		18	3.6	16.1
1	3	64.1	0.686	4	3	239.0	0.668	15	0.6	16.8		23	3.7	16.2
1	6	53.4	0.652	4	6	227.7	0.640	20	-0.8	16.7	28	+3.7	16.2	
1	9	41.7	0.631	4	9	215.7	0.627	25	0.9	16.7	Nov. 2	3.8	16.2	
1	12	29.5	0.627	4	12	203.5	0.631	Mar. 2	1.0	16.7		7	3.8	16.3
1	15	17.5	0.639	4	15	191.8	0.651	7	1.1	16.7		12	3.8	16.3
1	18	6.2	0.667	4	18	181.0	0.686	12	1.2	16.6	17	3.8	16.4	
1	21	356.0	0.707	4	21	171.4	0.729	17	-1.3	16.6	22	+3.8	16.4	
2	0	347.0	0.753	5	0	163.0	0.778	22	1.4	16.6	27	3.7	16.5	
2	3	339.1	0.803	5	3	155.5	0.828	27	1.5	16.5	Dec. 2	3.7	16.5	
2	6	332.0	0.852	5	6	148.9	0.875	Apr. 1	1.5	16.5		7	3.6	16.6
2	9	325.8	0.897	5	9	142.9	0.917	6	1.6	16.4		12	3.5	16.6
2	12	320.1	0.936	5	12	137.4	0.952	11	-1.6	16.4	17	+3.4	16.6	
2	15	314.8	0.966	5	15	132.3	0.978	16	1.6	16.3	22	3.4	16.7	
2	18	309.8	0.988	5	18	127.4	0.994	21	1.6	16.3	27	3.2	16.7	
2	21	304.9	0.999	5	21	122.6	1.000	26	-1.5	16.2	32	+3.1	16.7	

Position angle of satellite $p = p^1 + (P - P_0)$.

Apparent distance of satellite $s = \frac{F a(\rho)}{\rho}$.

ARENT ORBIT OF THE SATELLITE OF NEPTUNE AT DATE OF OPPOSITION,
JANUARY 25, 1918, AS SEEN IN AN INVERTING TELESCOPE.



Date.	Position Angle of Apsis.	Apparent Distance at Apsis.
Jan. 22	122.7	16.8
May 2	121.0	16.2
Oct. 13	126.0	16.1
Dec. 32	125.6	16.7

GREENWICH MEAN TIME OF GREATEST ELONGATION.

East.		West.		East.		West.		East.		West.	
d	h	d	h	d	h	d	h	d	h	d	h
1	7.9	Jan. 4	6.4	Mar. 24	15.5	Mar. 27	14.0	Oct. 16	5.9	Oct. 19	4.5
7	5.0	10	3.5	30	12.6	Apr. 2	11.1	22	2.9	25	1.5
13	2.1	16	0.6	Apr. 5	9.7	8	8.2	28	0.0	30	22.5
18	23.2	21	21.8	11	6.8	14	5.3	Nov. 2	21.0	Nov. 5	19.5
24	20.4	27	18.9	17	3.8	20	2.3	8	18.0	11	16.5
30	17.5	Feb. 2	16.0	23	0.9	25	23.4	14	15.0	17	13.6
5	14.6	8	13.1	28	21.9	May 1	20.4	20	12.1	23	10.6
11	11.7	14	10.3	May 4	18.9	7	17.4	26	9.1	29	7.6
17	8.9	20	7.4	10	15.9	13	14.5	Dec. 2	6.2	Dec. 5	4.7
23	6.0	26	4.5	16	12.9	19	11.5	8	3.2	11	1.8
1	3.1	Mar. 4	1.6	22	9.9	25	8.5	14	0.3	16	22.8
7	0.2	9	22.7	28	21.9	31	18.5	19	21.4	22	19.9
12	21.3	15	19.8	Oct. 4	12.0	Oct. 7	10.5	25	18.5	28	17.0
18	18.4	21	16.9	10	9.0	13	7.5	31	15.6	34	14.1

In the above diagram the central circle represents the planet.
The sidereal period of the satellite of Neptune is 5^d 21^h.044.

PHENOMENA, 1918.

MEAN TIME.

GREENWICH MEAN TIME.

PLANETARY CONFIGURATIONS.

d h m				° ' "			
ne	23	-	-	☾	Par. ecl. vis. at Wash.		
	26	14	-	♂ ☿ ☾	Superior.		
	28	2	37	♂ ☿ ☾	..... ☿ - 5 59		
ly	3	22	-	♂	Greatest Hel. Lat N.		
	4	20	-	⊕	in Aphelion.		
	5	1	35	♂ ♀ ☾	..... ♀ - 3 6		
	6	14	15	♂ ♃ ☾	..... ♃ + 0 19		
	9	2	20	♂ ♀ ☾	..... ♀ + 5 18		
	9	12	25	♂ ♀ ☾	..... ♀ + 3 41		
	10	4	50	♂ ♃ ☾	..... ♃ + 5 21		
	10	15	-	♂	in ☿		
	11	22	-	♂ ♀ ♀	..... ♀ + 1 55		
	14	22	16	♂ ♀ ☾	..... ♀ + 5 12		
	17	5	-	♂ ♀ ♃	..... ♀ + 0 26		
	25	8	23	♂ ☿ ☾	..... ☿ - 5 53		
	26	21	-	♂ ♀ ♃	..... ♀ - 0 36		
	27	9	-	♂ ♀	in ☿		
	30	8	-	♂ ♀ ☾	..... ♀ + 0 58		
ug.	3	7	51	♂ ♃ ☾	..... ♃ + 1 27		
	3	23	0	♂ ♀ ☾	..... ♀ + 1 27		
	5	1	-	♂	Greatest elong. E. 27 21		
	5	21	59	♂ ♀ ☾	..... ♀ + 3 44		
	6	15	-	♂	in Aphelion.		
	6	19	25	♂ ♃ ☾	..... ♃ + 5 32		
	8	19	47	♂ ♀ ☾	..... ♀ + 3 2		
	11	2	-	♂ ♃ ☾	..... ♃ + 3 42		
	12	14	2	♂ ♀ ☾	..... ♀ + 3 42		
	13	10	-	♂	in ☿		
	18	4	-	♂	Stationary.		
	19	1	-	♂ ☿ ☾	..... ☿ - 5 47		
	21	15	54	♂ ♀ ♀	..... ♀ + 0 37		
	24	11	-	♂ ♀ ☾	Greatest Hel. Lat. S.		
	27	0	-	♂	..... ♃ + 1 37		
pt.	1	13	-	♂ ☿ ☾	Inferior.		
	2	6	12	♂ ♀ ☾	..... ♀ + 3 52		
	3	6	0	♂ ♀ ☾	..... ♀ + 5 36		
	3	9	1	♂ ♃ ☾	..... ♃ + 5 48		
	4	12	21	♂ ♀ ☾	..... ♀ + 1 48		
	4	14	-	♂ ♀ ♃	..... ♀ - 0 5		
	10	5	-	♂	Stationary.		
	10	8	44	♂ ♀ ☾	..... ♀ + 1 49		
	14	21	-	♂ ♀ ♀	..... ♀ - 1 20		
	15	0	-	♂	in ☿		
	15	19	-	♂	in Perihelion.		
	17	19	-	♂	Greatest elong. W. 17 52		
	18	0	51	♂ ☿ ☾	..... ☿ - 5 48		
	19	15	-	♂	in Perihelion.		
	23	8	46	☾	enters ♈, Autumn com.		
	24	19	-	♂ ♀ ♀	..... ♀ + 0 20		
	27	12	14	♂ ♃ ☾	..... ♃ + 2 13		
	29	13	25	♂ ♀ ☾	..... ♀ + 4 7		
d h m				° ' "			
Sept.	29	22	-	♂	Greatest Hel. Lat. N.		
	30	21	22	♂ ♃ ☾	..... ♃ + 6 9		
Oct.	3	16	42	♂ ♀ ☾	..... ♀ + 6 54		
	4	2	57	♂ ♀ ☾	..... ♀ + 7 7		
	7	22	-	♂	Greatest Hel. Lat. N.		
	8	8	-	☾ ☿ ☾	..... ☿ - 0 19		
	9	5	54	♂ ♀ ☾	Superior.		
	15	0	-	♂ ☿ ☾	..... ☿ - 5 57		
	15	9	52	♂ ♀ ☾	in ☿		
	23	9	-	♂	..... ♃ + 2 40		
	24	23	7	♂ ♀ ☾	..... ♀ + 4 22		
	26	20	37	♂ ♃ ☾	..... ♃ + 6 31		
	28	8	32	♂ ♀ ☾	..... ♀ + 6 31		
Nov.	2	1	-	☾ ☿ ☾	in Aphelion.		
	2	14	-	♂	..... ♀ + 4 26		
	3	1	0	♂ ♀ ☾	Stationary.		
	3	3	-	♂	Stationary.		
	3	12	-	♂ ☿ ☾	..... ♀ + 0 24		
	4	12	20	♂ ♀ ☾	..... ♀ - 2 29		
	7	5	20	♂ ♀ ☾	..... ♀ - 2 29		
	11	17	40	♂ ☿ ☾	..... ☿ - 6 6		
	11	23	-	♂	Stationary.		
	16	13	-	☾ ☿ ☾	..... ☿ - 6 6		
	20	13	-	☾ ♃ ☾	..... ♃ + 2 48		
	21	7	39	♂ ♃ ☾	..... ♃ + 2 48		
	22	23	-	♂	Greatest Hel. Lat. S.		
	23	4	42	♂ ♀ ☾	..... ♀ + 4 31		
	23	12	-	♂ ♀ ☾	Superior.		
	24	18	39	♂ ♃ ☾	..... ♃ + 6 48		
	29	16	-	♂	Greatest elong. E. 21 30		
Dec.	2	23	-	♂	in ☿		
	3	-	-	☾	Ann. ecl. invis. at Wash.		
	3	8	25	♂ ♀ ☾	..... ♀ - 0 2		
	4	22	9	♂ ♀ ☾	..... ♀ - 3 31		
	6	6	28	♂ ♀ ☾	..... ♀ - 4 29		
	8	13	-	♂	Stationary.		
	9	0	25	♂ ☿ ☾	..... ☿ - 6 9		
	10	3	-	♂	Stationary.		
	11	23	-	♂	in ☿		
	14	12	-	♂	Greatest Hel. Lat. S.		
	15	21	-	♂ ♀ ♀	..... ♀ + 1 48		
	16	14	-	♂ ♀	in Perihelion.		
	18	4	-	♂ ☿ ☾	Inferior.		
	18	13	31	♂ ♃ ☾	..... ♃ + 2 39		
	18	19	-	♂	in ☿		
	20	13	35	♂ ♀ ☾	..... ♀ + 4 29		
	22	3	30	♂ ♃ ☾	..... ♃ + 6 54		
	22	3	42	☾	enters ♏, Winter com.		
	26	21	-	♂	Greatest Hel. Lat. N.		
	28	10	-	♂	Stationary.		
	31	1	41	♂ ♀ ☾	..... ♀ + 2 16		

Log ρ (including altitude).	Longitude from Greenwich.
	h m s
9.999317	+ 0 7 0.1
9.999526	- 9 14 20.07 ^a
9.999523	- 9 14 20.17 ^a
9.999336	+ 4 55 7.12 ^a
9.999335	+ 4 54 59.97 ^a
9.999501	- 0 12 8.38
9.999411	+ 5 20 5.80 ^d
9.999411	+ 5 20 2.93
9.999346	+ 4 50 5.93 ^e
9.999346	+ 4 50 4.67 ^f
9.999360	+ 5 34 55.27 ^a
9.999307	+ 5 53 35.92 ^g
9.999316	- 0 45 1.30
0.000052	+ 4 46 11.73 ^h
9.999040	+ 0 26 35.4 ^c
9.999456	- 1 34 53 ⁱ
9.999418	+ 5 6 29.1 ^j
9.999167	- 0 43 33.57 ^c
9.999391	- 0 8 28.0
9.999391	+ 5 56 7.4
9.999060	- 0 40 57.74
9.999458	+ 8 9 2.72
9.999085	- 0 53 34.80 ^l
9.999081	- 0 53 34.41
9.999081	- 0 53 27.40
9.999084	- 0 53 54.2
9.999260	- 0 29 45.70 ^c
9.999235	- 0 23 57.13
9.999071	+ 0 51 40.9
9.999435	+ 5 46 5 ⁱ
0.000170	+ 4 56 23.5
9.999849	- 4 51 15.72
9.999170	- 0 28 23.17
9.999281	+ 0 2 5.51 ⁱ
9.999341	+ 4 44 19.1 ⁱ
9.999442	+ 4 44 15.0
9.999042	- 0 40 31.02
9.999067	- 0 35 15
9.999170	- 1 8 8.72
9.999691	-10 12 6.17
9.999131	- 0 17 26.05
9.999123	- 0 17 28.02
9.999217	- 1 16 15.8
9.999091	- 0 0 22.75
9.999340	+ 4 44 31.05
9.999548	- 1 13 54.76
9.999421	- 0 33 14.9
9.999404	- 1 0 20.70
9.999163	- 2 24 55.75
9.999465	+ 5 14 5.33

^a Center of dome.^b Transit pier.^c Circle Syngma.^d Center of instrument house.^e Center of observatory.^f Floor of meridian room.



No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log p (Including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		" "	" "			h m s	"
51	Chicago, Ill.	+41 50 1.0	-11 31.2	. . .	9.999352	+5 50 26.84	+57.57
52	Christiania, Norway. . .	+59 54 44.0 ^a	-10 4.6	25 ^a	9.998908	-0 42 53.50 ^a	- 7.05
53	Cincinnati, Ohio . . .	+39 8 19.8 ^b	-11 20.7	247 ^b	9.999437	+5 37 41.40 ^b	+55.48
54	Cincinnati, Ohio . . .	+39 6 28.5	-11 20.5	. . .	9.999421	+5 37 59.00	+55.52
55	Cleveland, Ohio . . .	+41 30 14.5 ^c	-11 30.2	215 ^c	9.999375	+5 28 25.88 ^c	+53.62
56	Clinton, N. Y.	+43 3 17.0	-11 33.9	276	9.999340	+5 1 37.45	+49.55
57	Coimbra, Portugal . . .	+40 12 24.5	-11 25.6	99	9.999400	+0 33 43.1	+ 5.54
58	Columbia, Mo.	+38 56 51.7 ^d	-11 19.7	225 ^d	9.999440	+6 9 18.33 ^d	+60.67
59	Columbus, Ohio . . .	+39 59 50.4 ^d	-11 24.7	233 ^d	9.999414	+5 32 2.60 ^d	+54.55
60	Denmark	+55 41 12.6	-10 48.6	14	9.999005	-0 50 18.69 ^f	- 8.26
61	. . . . .	-31 25 15.5 ^g	+10 18.0	434 ^g	9.999634	+4 16 48.22 ^g	+42.19
62	. . . . .	+50 3 52.0 ^a	-11 25.2	221 ^a	9.999157	-1 19 50.27 ^a	-13.12
63	. . . . .	+54 21 18.0	-10 59.6	3	9.999036	-1 14 39.6	-12.28
64	. . . . .	+30 18 51.8 ^h	-10 5.3	681 ^h	9.999676	-5 12 11.76 ^h	-51.29
65	. . . . .	+39 40 36.4 ^a	-11 23.3	1644 ⁱ	9.999518	+6 59 47.72 ^a	+61.11
66	. . . . .	+41 36 0	-11 30.5	296	9.999400	+6 14 30.56	+61.52
67	asia	+58 22 47.2 ^a	-10 22.1	67 ^a	9.998945	-1 46 53.22 ^a	-17.56
68	. . . . .	+51 2 16.8	-11 20.8	121	9.999126	-0 54 54.74	- 9.02
69	. . . . .	+53 23 13.1 ^a	-11 6.7	86 ^a	9.999066	+0 25 21.1 ^a	+ 4.16
70	. . . . .	+57 9 36	-10 34.8	141	9.998979	+0 9 40.0	+ 1.59
71	. . . . .	+54 46 6.2 ^j	-10 56.4	107 ^k	9.999033	+0 6 19.75 ^j	+ 1.04
72	Dusseldorf	+51 12 25.0 ^l	-11 19.9	46 ^l	9.999117	-0 27 2.60 ^l	- 4.44
73	Edinburgh, Scotland . .	+55 55 30.0 ^a	-10 46.5	134 ^m	9.999007	+0 12 44.22 ^a	+ 2.09
74	Edinburgh, Scotland . .	+55 57 23.2 ⁿ	-10 46.2	106 ^o	9.999000	+0 12 43.05 ⁿ	+ 2.09
75	Elmira, N. Y.	+42 6 25	-11 31.9	. . .	9.999345	+5 7 13.90	+50.47
76	Evanston, Ill.	+42 3 33.4	-11 31.8	175	9.999358	+5 50 42.3	+57.61
77	. . . . .	+35 12 30.5	-10 54.7	2210	9.999667	+7 26 44.58	+73.39
78	. . . . .	+39 8 13.2 ^r	-11 20.7	165	9.999431	+5 8 47.73	+50.73
79	. . . . .	+42 52 46.2	-11 33.6	152	9.999336	+5 8 1.00	+50.60
80	Geneva, Switzerland . .	+46 11 59.3 ^a	-11 35.2	407 ^a	9.999268	-0 24 36.61 ^a	- 4.04
81	Genoa, Italy	+44 25 9.3 ^a	-11 35.5	105	9.999293	-0 35 41.28 ^a	- 5.66
82	Georgetown, D. C. . . .	+38 54 26.7 ^b	-11 19.5	47	9.999429	+5 8 18.26 ^b	+50.65
83	Glasgow, Mo.	+39 13 45.6	-11 21.1	227	9.999411	+6 11 18.08	+61.00
84	Glasgow, Scotland . . .	+55 52 42.8 ^a	-10 46.9	55 ^p	9.999003	+0 17 10.55 ^a	+ 2.82
85	Gotha, Germany	+50 56 37.9 ⁱ	-11 21.2	322 ^a	9.999142	-0 42 50.51 ⁱ	- 7.04
86	Gotha, Germany	+50 56 4.4 ^j	-11 21.2	360 ^j	9.999145	-0 42 55.09 ^j	- 7.05
87	. . . . .	+51 31 48.1 ^q	-11 18.2	161 ^q	9.999111	-0 39 46.22 ^q	- 6.53
88	. . . . .	+39 38 46.6 ^a	-11 23.1	262 ^a	9.999425	+5 47 24.36 ^a	+57.07
89	. . . . .	+51 28 38.2 ^a	-11 18.5	49 ^a	9.999110	0 0 0.00 ^a	0.00
90	Hamburg, Germany . . .	+53 33 6.0	-11 5.6	25	9.999057	-0 39 53.60 ^a	- 6.55
91	Hamburg, Germany . . .	+53 32 51.3 ^d	-11 5.6	30 ^d	9.999058	-0 39 53.46 ^d	- 6.55
92	. . . . .	+43 42 15.3	-11 34.8	183	9.999317	+4 49 8.02	+47.50
93	Haverford, Pa.	+40 0 40.1 ^r	-11 24.8	. . .	9.999398	+5 1 12.70 ^r	+49.48
94	Heidelberg, Baden . . .	+49 23 55.2 ^e	-11 27.8	567 ^e	9.999198	-0 34 53.13 ^e	- 5.73
95	Heidelberg, Baden . . .	+49 23 55.7 ^f	-11 27.8	570 ^f	9.999198	-0 34 52.96 ^f	- 5.73
96	Heidelberg, Baden . . .	+49 24 34.3 ⁱ	-11 27.8	126 ⁱ	9.999168	-0 34 46.80 ⁱ	- 5.71
97	Helsingfors, Finland . .	+60 9 42.3 ^a	-10 1.5	33 ^a	9.998903	-1 39 49.10 ^a	-16.40
98	Herény, Hungary	+47 15 47.4	-11 33.7	229	9.999229	-1 6 24.7	-10.91
99	Hong Kong, China . . .	+22 18 13.2 ^j	- 8 7.4	33 ^j	9.999793	-7 36 41.86 ^j	-75.01
100	Iowa City, Iowa	+41 40 0	-11 30.7	183	9.999369	+6 6 6	+60.14

^a Meridian circle.^b Center of dome.^c Zenith telescope pier.^d Transit pier.^e Observatory bench mark.^f Center of observatory.^g Old meridian circle.^h Floor-level of zenith sector pillar.ⁱ^j^k^l^mⁿ

n.

transit in-
cels.^o Floor of main building.^p Floor of meridian circle room.^q Position of meridian circle before 1884.^r Zenith telescope.^s Repeal meridian circle.^t Bruce telescope.

No.	Authority for—		Description.
	Latitude.	Longitude.	
51	U. S. Lake Survey, 1864.	Smithsonian Report, 1886.	^a Dearborn Observatory.
52	<i>Astron. Nach.</i> , Nr. 3193, 1893.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
53	<i>Publications of the Obs.</i> , 1908.	<i>Astronomical Journal</i> , 1897.	Cincinnati Obs., since 1873.
54	Letter from Director, 1897.	<i>Astronomical Journal</i> , 1854.	Cincinnati Obs., before 1873.
55	Letter from Director, 1913.	Letter from Director, 1913.	Case Obs., Case School of Appl'd Sci.
56	<i>Astron. Nach.</i> , Nr. 2553, 1883.	<i>Astron. Nach.</i> , Nr. 2553, 1883.	Litchfield Obs., Hamilton College.
57	<i>Eph. Astron. de Coimbra</i> , 1889.	<i>Eph. Astron. de Coimbra</i> , 1889.	University Observatory.
58	<i>Trans. Acad. of Sci. of St. Louis</i> , 1894.	<i>Trans. Acad. of Sci. of St. Louis</i> , 1894.	Laws Obs., Univ. of Mo.
59	Letter from Director, 1913.	Letter from Director, 1899.	McMillin Obs., State Univ.
60	British Nautical Almanac.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
61	<i>Resultados del Obs.</i> , 1887.	<i>Resultados del Obs.</i> , 1887.	National Observatory.
62	Letter from Director, 1913.	Letter from Director, 1913.	Imperial and Royal Obs.
63	Letter from Director, 1897.	Letter from Director, 1897.	Obs. of the School of Navigation.
64	<i>Great Trig. Survey of India</i> , 1906.	Letter from Supt. of Survey, 1913.	Haig Obs., Trig. Survey of India.
65	Letter from Director, 1913.	Letter from Director, 1913.	Chamberlin Obs., Univ. of Denver.
66	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Drake Univ. Obs.
67	<i>Publikationen der Sternw.</i> , 1911.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial University Obs.
68	<i>Berliner Jahrbuch</i> .	<i>Berliner Jahrbuch</i> .	^b Baron Engelhardt's Obs.
69	<i>Trans. Royal Dublin Soc.</i> , 1889.	<i>Trans. Royal Irish Acad.</i> , 1838.	Dunsink Obs., Trinity College.
70	Letter from Royal Astronomer, 1897.	Letter from Royal Astronomer, 1897.	^c Lord Crawford's Obs.
71	Letter from Director, 1913.	Letter from Director, 1913.	University Observatory.
72	<i>Astron. Nach.</i> , Nr. 643, 1848.	Letter from Director, 1913.	Municipal Obs., Bilk.
73	<i>Monthly Notices, R. A. S.</i> , 1907.	Letter from Director, 1913.	Royal Obs. since 1895; Blackford Hill.
74	<i>Monthly Notices, R. A. S.</i> , 1836.	<i>Edinburgh Observations</i> , 1858.	^d Royal Obs. before 1895; Calton Hill.
75	Letter from Director, 1912.	Letter from Director, 1912.	Elmira College Obs.
76	Letter from Director, 1893.	Letter from Director, 1893.	Dearborn Obs., North Western Univ.
77	British Nautical Almanac.	British Nautical Almanac.	Lowell Observatory.
78	See footnote (^f).	See footnote (^k).	International Lat. Obs.
79	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Smith Observatory.
80	<i>Memoire par J. Pidoux</i> , 1900.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Municipal Observatory.
81	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Hydrographic Institute.
82	See footnote (^e).	See footnote (^e).	Georgetown College Obs.
83	<i>Astron. Nach.</i> , Nr. 2625, 1884.	<i>Washington Observations</i> , 1877.	Morrison Observatory.
84	<i>First Glasgow Catalogue</i> , 1870.	<i>Monthly Notices, R. A. S.</i> , 1865.	University Observatory.
85	Letter from Director, 1913.	Letter from Director, 1913.	Ducal Obs. since 1857.
86	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Ducal Obs. before 1857
87	<i>Astron. Nach.</i> , Nr. 4428, 1910.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal University Obs.
88	Letter from Director, 1912.	Letter from Director, 1912.	McKim Obs., De Pauw Univ.
89	<i>Greenwich Observations</i> , 1910.	<i>Greenwich Observations</i> , 1910.	^f Royal Observatory.
90	Letter, Director new Obs., 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	^g Hamburg Observatory before 1909.
91	Letter from Director, 1913.	Letter from Director, 1913.	^h Imperial Marine Obs.
92	Letter from Director, 1894.	Letter from Director, 1894.	Shattuck Obs., Dartmouth College.
93	<i>Proc. Amer. Ph. Soc.</i> , 1883.	<i>Proc. Amer. Ph. Soc.</i> , 1883.	Haverford College Obs.
94	Letter from Director, 1913.	Letter from Director, 1913.	Astron. Institute, Königstuhl Obs.
95	<i>Publik. des Obs.</i> , Königstuhl, 1902.	<i>Publik. des Obs.</i> , Königstuhl, 1902.	Astrophys. Inst., Königstuhl Obs.
96	<i>Publik. des Obs.</i> , Königstuhl, 1902.	<i>Publik. des Obs.</i> , Königstuhl, 1902.	ⁱ Dr. Wolf's Obs. before 1898.
97	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Univ. Obs.
98	<i>Astron. Nach.</i> , Nr. 2633, 1884.	British Nautical Almanac.	Astrophysical Observatory.
99	<i>Hong Kong Observations</i> , 1897.	Letter from Director, 1897.	Colonial Observatory.
100	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Obs., Univ. of Iowa.

^a Transferred to Evanston, Ill., in 1887.^b Instruments transferred to Univ. of Kasan in 1897.^c Instruments transferred to Royal Obs. at Edinburgh in 1896.^d City Obs. since 1896.^e Based upon data from the U. S. C. and G. Survey.^f Point of reference before 1851, 7½ ft. N., 19 ft. W.^g At Bergedorf since 1909.^h Transit instrument before 1908, 0° 5' N., 0° 04' W.ⁱ Instruments transferred to the Astrophysical Institute of the Königstuhl Obs. in 1898.^j *Resultate des Internationalen Breitendienstes*, 1900-1908.^k *Resultate des Internationalen Breitendienstes*, Band I, 1903.

No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log ρ (including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		" ' "	" "			h m s	"
101	Ithaca, N. Y.	+42 26 47.3 ^a	-11 32.6	256 ^a	9.999354	+5 5 55.99 ^a	+50.26
102	Ithaca, N. Y.	+42 26 51.4	-11 32.6		9.999337	+5 5 56.47	+50.26
103	Indies	+18 24 51 ^b	-6 55.9	540 ^b	9.999402	+5 11 29.48 ^b	+51.17
104	Jena,	+50 55 34.9 ^c	-11 21.3	165 ^c	9.999132	-0 46 20.22 ^c	-7.61
105	Jena,	+50 55 35.8	-11 21.3	155	9.999131	-0 46 20.31	-7.61
106	Jena,	+50 56 11.0	-11 21.3	174	9.999132	-0 46 20.73	-7.61
107		-26 10 54.6 ^d	+9 9.8	1804 ^d	9.999840	-1 52 18.0 ^d	-18.45
108		+46 31 41.7 ^b	-11 34.8	117 ^e	9.999240	-1 15 54.12 ^b	-12.47
109		+55 50 20.0 ^f	-10 47.3	98 ^f	9.999007	-3 15 15.61 ^f	-32.06
110	Kazan, Russia	+55 47 23.9 ^g	-10 47.7	79 ^g	9.999007	-3 16 29.00 ^g	-32.22
111	Kew, England	+51 28 6	-11 18.5	10	9.999108	+0 1 15.1	+0.21
112	"	+50 27 10.0 ^h	-11 23.5	179 ^f	9.999145	-2 2 0.56 ^f	-20.04
113	"	+54 20 27.6 ^f	-10 59.7	52 ^f	9.999041	-0 40 35.45 ^f	-6.67
114	"	+47 41 54.8	-11 32.8		9.999202	-1 18 11.7	-12.26
115	"	+54 42 50.5 ^f	-10 56.8	24 ^f	9.999029	-1 21 58.97 ^f	-13.47
116		+48 3 23.1 ^f	-11 32.0	384 ^f	9.999220	-0 56 31.58 ^f	-9.29
117		-34 54 31.8 ^h	+10 52.2	18 ^h	9.999525	+3 51 44.8 ^h	+36.07
118		+52 9 19.8 ^f	-11 14.6	6 ^f	9.999000	-0 17 56.15 ^f	-2.96
119	Leipzig, Saxony	+51 20 5.9 ⁱ	-11 19.2	119 ⁱ	9.999118	-0 49 33.92 ⁱ	-8.14
120	Leipzig, Saxony	+51 20 20.1	-11 19.2		9.999110	-0 49 29.92	-8.13
121		+50 37 6	-11 22.8	127	9.999137	-0 22 15.44	-3.66
122	Portugal	+38 42 30.5 ^f	-11 18.5	95 ^f	9.999437	+0 36 44.68 ^f	+6.04
123		+53 24 4.8	-11 6.6	11	9.999064	+0 12 17.33	+2.02
124		+53 24 47.8	-11 6.5		9.999059	+0 12 0.11	+1.97
125	Lund, Sweden	+55 41 51.6 ⁱ	-10 48.5	38	9.999006	-0 52 44.97 ⁱ	-8.67
126	Lund, Sweden	+55 52 12.0	-10 47.0		9.999000	-0 52 47.50	-8.67
127	Austria	+44 32 11.0	-11 35.5	42	9.999200	-0 57 52.41	-9.51
128		+45 41 41.0	-11 35.5	299	9.999274	-0 19 8.52 ^k	-3.14
129		+43 4 36.8 ^f	-11 33.9	292 ⁱ	9.999040	+5 57 37.90 ^f	+58.75
130		+13 4 8.0 ^f	-5 5.5	7	9.999025	-5 20 59.14	-52.78
131	Madrid, Spain	+40 24 30.0 ^m	-11 26.4	655 ^m	9.999433	+0 14 45.09 ^m	+2.42
132		+14 34 41	-5 38.2	11	9.999000	-8 3 54.2	-79.46
133		+38 5 55.8 ⁿ	-11 15.0	18 ⁿ	9.999447	+8 9 5.63 ⁿ	+80.35
134		+54 10 31.8	-11 1.0	115	9.999044	+0 33 48.4	+5.55
135	Marseilles, France . .	+43 18 19 ^f	-11 34.3	75 ^o	9.999000	-0 21 34.55 ^f	-3.54
136	Marseilles, France . .	+43 17 52	-11 34.3	27	9.999317	-0 21 28.1	-3.53
137		-20 5 39	+7 27.7	54	9.999832	-3 50 12.6	-37.82
138		-37 49 53.2 ^p	+11 13.4	28 ^q	9.999454	-9 39 53.92 ^p	-95.26
139		+48 48 18	-11 29.8	111	9.999185	-0 8 55.6	-1.47
140	Middletown, Conn. . .	+41 33 16.0	-11 30.4		9.999359	+4 50 37.18	+47.74
141		+45 27 59.3	-11 35.6	120	9.999268	-0 36 45.88 ^r	-6.04
142	"	+44 58 40.0 ^r	-11 35.7	260 ^r	9.999290	+6 12 56.84 ^r	+61.27
143		+39 8 3.6 ^z	-11 20.7	62	9.999424	-9 24 30.75	-92.74
144		+44 38 51.4	-11 35.6	64	9.999285	-0 43 43.40	-7.18
145		+45 30 20 ^s	-11 35.6	57 ^s	9.999262	+4 54 18.63 ^s	+48.35
146	Russia	+55 45 19.5	-10 48.0	150 ^f	9.999012	-2 30 17.03 ^f	-24.69
147	Cal.	+37 20 25.6 ^r	-11 10.4	1284 ^r	9.999552	+6 6 34.89 ^r	+79.93
148		+34 12 59.5 ^t	-10 46.2	1799 ^t	9.999663	+7 52 14.33 ^t	+77.58
149	Mount Wilson, Cal. . .	+34 12 55	-10 46.1	1727 ^u	9.999658	+7 52 14.3	+77.58
150	Munich, Bavaria . . .	+48 8 45.5 ^v	-11 31.7	529 ^v	9.999227	-0 46 26.02 ^v	-7.63

com.

f

h

i

m

n

o

p

q

circle.

s

t

u Floor.

v West dome.

w Photographic equatorial, 41 feet south

of prime vertical transit.

x Zenith telescope.

Authority for—		Description.
Latitude.	Longitude.	
Letter from the Dean, 1913. Letter from the Dean, 1913. <i>Memoirs, R. A. S.</i> , 1879. Letter from Director, 1913. Letter, Director new Obs., 1913. <i>V. J. S. Astron. Gesell.</i> , 1910. Transvaal Obs. <i>Circular</i> , 1910. Letter from Director, 1913. Letter from Director, 1913. Publications of the Obs., 1911. Letter from Director, 1897. <i>Annales de l' Obs.</i> , Vol. IV, 1893. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913. Letter from Director, 1897. Letter from Director, 1913. Letter from Director, 1913. Letter from Director, 1913. Letter, Director new Obs., 1913. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913. <i>Monthly Notices, R. A. S.</i> , 1894. <i>British Nautical Almanac</i> , 1872. Letter from Director, 1913. Letter, Director new Obs., 1913. Letter from Director, 1897. Letter from Director, 1897. <i>Publications of the Obs.</i> , 1892. <i>Great Trig. Survey of India</i> , 1906. <i>Annuario del Obs.</i> , 1912. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913. <i>Astron. Nach.</i> , Nr. 758, 1851. Letter from Director, 1913. Letter, Director new Obs., 1913. <i>Mag. and Meteor. Results</i> , 1908. <i>Astron. Results</i> , 1881–84. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1894. <i>Pubbl. del R. Osserv.</i> , 1914. Letter from Director, 1913. See footnote (h). Letter from Director, 1913. Letter from Director, 1912. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Publications of the Obs.</i> , 1900. <i>Astrophysical Journal</i> , 1906. Letter from C. G. Abbot, 1912. Letter from Director, 1897.	Letter from the Dean, 1913. Letter from the Dean, 1913. See footnote (c). Letter from Director, 1913. Letter, Director new Obs., 1913. <i>V. J. S. Astron. Gesell.</i> , 1910. Transvaal Obs. <i>Circular</i> , 1910. Letter from Director, 1913. Publications of the Obs., 1911. Letter from Director, 1913. Letter from Director, 1897. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Astron. Nach.</i> , Nr. 3993, 1905. Letter from Director, 1913. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Astron. Nach.</i> , Nr. 3993, 1905. Letter, Director new Obs., 1913. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Astron. Nach.</i> , Nr. 3202, 1893. <i>Monthly Notices, R. A. S.</i> , 1894. <i>British Nautical Almanac</i> , 1872. <i>Astron. Nach.</i> , Nr. 3993, 1905. Letter, Director new Obs., 1913. Letter from Director, 1897. <i>Astron. Nach.</i> , Nr. 3202, 1893. Letter from Director, 1912. <i>Great Trig. Survey of India</i> , 1901. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Lick Obs. Bulletin</i> , 1908. <i>British Nautical Almanac</i> , 1901. <i>Astron. Nach.</i> , Nr. 3993, 1905. Letter, Director new Obs., 1913. <i>Mag. and Meteor. Results</i> , 1908. <i>Astron. Results</i> , 1881–84. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1894. <i>Astron. Nach.</i> , Nr. 3993, 1905. Letter from Director, 1913. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913. <i>U. S. C. and G. S. Report</i> , 1897. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>U. S. C. and G. S. Report</i> , 1897. <i>Astrophysical Journal</i> , 1906. Letter from C. G. Abbot, 1912. <i>Astron. Nach.</i> , Nr. 3993, 1905.	a Fuertes Obs., Cornell Univ. b Fuertes Obs., Cornell Univ. Mr. Hall's Obs., Montego Bay. Univ. Obs., since 1888. Univ. Obs., before 1888. The late Dr. Winkler's Obs. Unlon Obs., formerly Transvaal Obs. Archiepiscopal Haynald Obs. Engelhardt Obs., Univ. of Kasan. University Observatory. Meteorological Obs., London. Imperial Univ. Obs. d Royal University Obs. Near Aszöd, Hungary. Royal University Obs. Obs. of the Benedictines. National Univ. Obs. University Observatory. University Obs., since 1861. University Obs., before 1861. University Obs., Cointe. Obs. of Lisbon. Bidston, Birkenhead, since 1867. Liverpool Obs., before 1867. Royal Univ. Obs., since 1867. Royal Univ. Obs., before 1867. Manora Observatory. Obs. of the Univ., St. Gents Laval. Washburn Obs., Univ. of Wis. Obs. founded by East India Co. Astron. and Meteorolog. Obs. Meteorological Observatory. Chronom. and Time Sta., Navy Yd. Col. Cooper's Observatory. See footnote (e). See footnote (f). Royal Alfred Obs. g Government Observatory. Seine-et-Oise, near Paris. Wesleyan University Obs. Royal Observatory, Brera. Obs. Univ. of Minn. International Lat. Obs. Royal Univ. Geophysical Obs. McGill University Obs. Obs. of the Imperial Univ. Lick Obs., Univ. of Cal. Solar Obs., Carnegie Inst. Branch of Smithson. Astrophys. Obs. Royal Observatory.

a Since 1902.

b Before 1902.

c *British Report on Transit of Venus*, 1882.

d Old position of meridian circle, 0° 9' N., 0° 12' E.

e National Obs., Univ. of Aix-Marseilles, since 1864–66.

f National Obs., at Accoules, before 1864–66.

g Transferred from Williamstown in 1861.

h *Resultate des Internationalen Breitendienstes*, 1900–1908.

i With the new values of the longitudes of Adelaide and Sydney.

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (Meters).	Log ρ (Including altitude).	Longitude from Greenwich.	Reduction from Greenwich to Local S.T.M.N.
		" "	" "			h m s	"
151		+40 51 46.3	-11 28.1	164	9.999322	-0 57 1.70 ^a	- 9.37
152		+38 8 54.4 ^b	-11 2.0	172 ^c	9.999505	+5 47 12.2	+57.04
153		+46 59 50.6	-11 34.1	111	9.999254	-0 27 49.90 ^d	- 4.57
154		+40 30 1.4 ^b	-11 26.7	21 ^b	9.999387	+4 57 47.45 ^b	+43.92
155	New Haven, Conn. . .	+41 19 22.3	-11 29.6	40	9.999368	+4 51 40.58	+47.92
156	New Haven, Conn. . .	+41 18 36.5	-11 29.6	...	9.999325	+4 51 42.16	+47.92
157	New York, N. Y. . .	+40 48 34.6	-11 27.9	25	9.999380	+4 55 50	+48.00
158	New York, N. Y. . .	+40 45 23.1	-11 27.7	...	9.999370	+4 55 53.64	+48.61
159		+43 43 16.9 ^e	-11 34.9	378	9.999330	-0 29 12.15 ^e	- 4.80
160		+46 58 22.1	-11 34.2	55	9.999225	-2 7 53.78 ^a	-21.01
161		+42 19 1.9 ^b	-11 32.4	70 ^b	9.999345	+4 50 33.10 ^b	+47.73
162		+44 27 41.6 ^f	-11 35.5	290 ^f	9.999305	+6 12 35.92 ^f	+61.21
163		+37 48 5 ^d	-11 13.2	11 ^d	9.999454	+8 9 6.55 ^d	+80.35
164		+46 28 37.5	-11 34.9	...	9.999234	-2 3 2.18 ^b	-20.21
165	Odessa, Russia . . .	+46 28 36.7 ^d	-11 34.9	55 ^d	9.999237	-2 3 2.04 ^d	-20.21
166	O-Gyalla, Hungary . .	+47 52 27.3	-11 32.4	111	9.999206	-1 12 45.49	-11.95
167	Omaha, Nebr. . . .	+41 16 5.6 ^b	-11 29.5	344 ^b	9.999390	+6 23 46.96 ^b	+63.05
168	Orono, Me.	+44 54 0	-11 35.6	38	9.999277	+4 34 40.3	+45.12
169	Ottawa, Canada . . .	+45 23 39.1 ^d	-11 35.6	85 ^d	9.999217	+5 2 51.98 ^d	+49.75
170	Oxford, Miss. . . .	+34 22 12.6	-10 47.5	...	9.999210	+5 58 7.18	+58.83
171	Oxford, England . . .	+51 45 35.6 ^d	-11 16.9	65 ^a	9.999104	+0 5 2.6	+ 0.83
172		+51 45 34.2	-11 16.9	64	9.999104	+0 5 0.40	+ 0.82
173		+45 24 1.0 ⁱ	-11 35.6	31 ^j	9.999263	-0 47 29.13 ⁱ	- 7.99
174		+38 6 44.0 ^k	-11 15.1	76 ^d	9.999451	-0 53 25.87	- 8.73
175	Paris, France	+48 50 11.2 ⁱ	-11 29.8	67 ^m	9.999178	-0 9 20.93 ⁿ	- 1.53
176	Patna, India	-31 57 8.9 ^d	+10 23.8	60	9.999007	-7 43 21.51 ^d	-76.12
177		+39 58 2.1 ^o	-11 24.6	74 ^o	9.999404	+5 1 6.81 ^o	+49.46
178		+44 51 48.6 ^d	-11 35.6	32 ^d	9.999277	-0 55 23.07 ^d	- 9.10
179		+52 22 56.0 ^p	-11 13.3	97 ^p	9.999001	-0 52 15.86 ^p	- 8.59
180	Y.	+41 41 18	-11 30.8	61	9.999360	+4 55 33.6 ^b	+48.55
181		+50 5 16.0 ^o	-11 25.1	197 ^o	9.999155	-0 57 40.28 ^o	- 9.47
182		+40 20 55.8	-11 26.1	75	9.999395	+4 58 39.44	+49.00
183	Princeton, N. J. . . .	+40 20 57.3 ^d	-11 26.1	65 ^d	9.999394	+4 58 37.61 ^d	+49.05
184	Providence, R. I. . .	+41 50 21	-11 31.2	64	9.999352	+4 45 35.95	+46.92
185	Providence, R. I. . .	+41 49 46.4	-11 31.2	...	9.999360	+4 45 37.64	+46.92
186		+59 48 18.7 ^a	-10 6.2	75 ^q	9.999014	-2 1 18.57 ^a	-19.93
187		+46 47 59.2	-11 34.4	90	9.999231	+4 44 52.71 ^b	+46.89
188		- 0 14 0	+ 0 5.6	2908	0.000198	+5 14 6.66	+51.60
189		+56 57 9.3	-10 36.9	...	9.999974	-1 36 28.10 ^r	-15.85
190	Brazil	-22 54 23.8 ^o	+ 8 17.7	62 ^o	9.999784	+2 52 41.4 ^o	+28.37
191	Rome, Italy	+41 53 53.6 ^d	-11 31.3	51 ^j	9.999354	-0 49 55.12 ^d	- 8.20
192	Rome, Italy	+41 53 33.6 ^d	-11 31.3	65 ^q	9.999355	-0 49 56.34 ^d	- 8.20
193	Rome, Italy	+41 54 12.4 ^d	-11 31.4	100 ^d	9.999357	-0 49 48.02 ^d	- 8.18
194	Rome, Italy	+41 54 16.7	-11 31.4	75 ^j	9.999355	-0 49 49.28 ^d	- 8.18
195	San Fernando, Spain .	+36 27 42.0 ^e	-11 4.3	30 ^e	9.999488	+0 24 49.32 ^e	+ 4.08
196	San Fernando, Spain .	+36 31 7	-11 4.7	...	9.999402	+0 25 10.82	+ 4.14
197	San Francisco, Cal. .	+37 47 27.9	-11 13.2	...	9.999454	+8 9 42.86 ^s	+80.45
198	San Luis, Arg. Rep. .	-33 17 45.7	+10 37.6	800	9.999616	+4 25 22	+43.00
199	Santiago, Chile . . .	-33 26 42 ^d	+10 39.0	520 ^d	9.999104	+4 42 46.0 ^d	+46.45
200	Santiago, Chile . . .	-33 26 25	+10 38.9	619	9.999600	+4 42 36.5	+46.42
201	Santiago, Chile . . .	-33 33 46 ^b	+10 40.1	580 ^b	9.999595	+4 42 46 ^b	+46.45

^d Meridian circle.
^e Small meridian circle.
^f Meridian circle pier.
^g Bench mark in east wall.

^h dome.
ⁱ South facade of observatory.
^j Level of obs. terrace.
^k Cassini's Meridian.

^a Center of dome.
^b Center of middle dome.
^c Main floor.
^d Tower of school.
^e Center of building, ground floor.
^f West transit pier.

a.	Authority for—		Description.
	Latitude.	Longitude.	
1	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Royal Obs., Capo di Monte.
2	Letter from the Dean, 1913.	Letter from Director, 1893.	Obs. of Vanderbilt Univ.
3	Swiss Triangulation, 1890.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Cantonal Observatory.
4	Letter from Director, 1913.	Letter from Director, 1913.	Schanck Obs., Rutgers College.
5	Letter from Director, 1893.	See footnote (b).	Yale Univ. Obs., since 1882.
6	Letter, Director new Obs., 1893.	Letter, Director new Obs., 1893.	Yale Univ. Obs., before 1882.
7	<i>Contributions from the Obs.</i> , 1906.	<i>Contributions from the Obs.</i> , 1906.	Columbia Univ. Obs., since 1897.
8	Letter from Director, 1879.	<i>British Nautical Almanac.</i>	Columbia Univ. Obs., before 1897.
9	<i>Annales de l'Obs.</i> , Tome II, 1887.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Mt. Gros, near Nice.
10	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Naval Observatory.
11	Letter from Director, 1913.	Harvard <i>Annals</i> , 1893.	Smith College Obs.
12	Letter from Director, 1912.	<i>Publications of Obs.</i> , 1901.	^a Goodsell Obs., Carleton College.
13	Letter from Director, 1912.	Letter from Director, 1912.	Chabot Observatory.
14	Pulkowa <i>Mitteilungen</i> , No. 56, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Branch of Pulkowa Obs.
15	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
16	Letter from Director, 1897.	Letter from Director, 1897.	Royal Astrophysical Obs.
17	Letter from Director, 1912.	Letter from Director, 1912.	Creighton University Obs.
18	Letter from Director, 1912.	Letter from Director, 1912.	Obs. Univ. of Maine.
19	Letter from Chief Astronomer, 1913.	Letter from Chief Astronomer, 1913.	Dominion Astronomical Obs.
20	Smithsonian <i>Report</i> , 1880.	Smithsonian <i>Report</i> , 1880.	Obs. Univ. of Mississippi.
21	<i>Radcliffe Catalogue of Stars</i> , 1900.	<i>Rudcliffe Observations</i> , 1842.	Radcliffe Observatory.
22	<i>Oxford Astron. Observations</i> , 1878.	<i>Oxford Astron. Observations</i> , 1878.	University Observatory.
23	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal University Obs.
24	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Royal Observatory.
25	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Observatory of Paris.
26	<i>Meridian Observations</i> , Vol. 2, 1908.	⁴ <i>Meridian Observations</i> , Vol. 2, 1908.	Government Observatory.
27	Letter from Director, 1913.	Letter from Director, 1913.	Flower Obs., Univ. of Pa.
28	Letter from Director, 1913.	Letter from Director, 1913.	See footnote (b).
29	<i>Veröff. K. Preuss. Geod. Inst.</i> , 1905.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Astrophysical Obs.
30	Smithsonian <i>Report</i> , 1880.	Smithsonian <i>Report</i> , 1880.	Vassar College Obs.
31	Prague <i>Observations</i> , 1907.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial and Royal Obs.
32	Letter from Director, 1913.	Letter from Director, 1913.	Halsted Obs., Princeton Univ.
33	Letter from Director, 1913.	<i>Washington Observations</i> , 1878.	Obs. of Instruction, Princeton Univ.
34	Letter from Director, 1893.	Letter from Director, 1893.	Ladd Obs., Brown Univ.
35	<i>Astron. Nach.</i> , Nr. 2254, 1879.	<i>Astron. Nach.</i> , Nr. 2254, 1879.	Mr. Seagrave's Observatory.
36	<i>Description de l'Obs.</i> , 1845.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. Central Nicolas.
37	Letter from Director, 1912.	Letter from Director, 1912.	Quebec Obs., Plains of Abraham.
38	Letter from Director, 1897.	Letter from Director, 1897.	National Observatory.
39	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Polytechnic School Obs.
40	See footnote (c).	See footnote (c).	National Observatory.
41	<i>Memorie del R. Osserv.</i> , 1904.	Letter from Director, 1913.	Royal Obs. at Roman College.
42	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Univ. Obs. at Capitol.
43	Letter from Director, 1913.	Letter from Director, 1913.	Vatican Obs., since 1906-7.
44	<i>Pubbl. della Specola Vaticana</i> , 1905.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	^d Vatican Obs., before 1906-7.
45	<i>Annales del Obs.</i> , 1892.	Letter from Director, 1913.	Naval Obs., since 1797.
46	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	^e Naval Obs., before 1797.
47	Letter from Director, 1897.	<i>U. S. C. and G. S. Report</i> , 1897.	Davidson Observatory.
48	Letter from Director, 1911.	Letter from Director, 1911.	Southern Obs. of Carnegie Inst.
49	Letter from Director, 1913.	Letter from Director, 1913.	^f National Obs., since 1862.
50	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	^g National Obs., before 1862.
51	Letter from Director, 1913.	Letter from Director, 1913.	National Obs., Espejo.

^a Old observatory, 1877-1896, 415 feet W.^b Observatory of Imperial and Royal Hydrographic Office.^c Green and Davis, *Telegraphic Determinations of Longitudes on the East Coast of South America*, 1880.^d In the Gregorian tower.^e In Cadiz.^f In Quinta Normal.^g On the hill Santa Lucia, in Santiago.^h Based upon data from the U. S. C. and G. Survey.ⁱ With the new value of the longitude of Sydney.

No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log <i>p</i> (Including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		" ' "	" ' "			h m s	"
202	South Bethlehem, Pa. .	+40 36 23.2 <i>a</i>	-11 27.2	110	9.999391	+ 5 1 31.96 <i>a</i>	+ 49.53
203	South Hadley, Mass. .	+42 15 18.2 <i>b</i>	-11 32.2	76 <i>b</i>	9.999346	+ 4 50 20.40 <i>b</i>	+ 47.70
204	St. Louis, Mo.	+38 38 3.0	-11 18.1	. . .	9.999472	+ 6 0 49.26	+ 59.27
205	St. Petersburg, Russia .	+59 56 32.0	-10 4.2	4	9.999400	- 2 1 11.4	- 19.91
206	Stockholm, Sweden . .	+59 20 32.7 <i>c</i>	-10 11.3	44 <i>c</i>	9.999372	- 1 12 13.97 <i>c</i>	- 11.87
207	Stonyhurst, England . .	+53 50 40	-11 3.4	117 <i>c</i>	9.999056	+ 0 9 52.68	+ 1.02
208	. . . . .	+48 35 0.3 <i>c</i>	-11 30.5	144 <i>c</i>	9.999190	- 0 31 4.52 <i>c</i>	- 5.11
209	. . . . .	+39 54 23.3	-11 24.3	. . .	9.999401	+ 5 1 24.89	+ 49.52
III	. . . . .	-33 51 41.1	+10 42.9	44	9.999552	-10 4 49.31	- 99.36
211	Syracuse, N. Y.	+43 2 13.1	-11 33.9	160	9.999332	+ 5 4 33.36	+ 50.06
III	. . . . .	+43 0 48.8 <i>b</i>	-11 33.8	137 <i>a</i>	9.999331	+ 5 4 34.31 <i>b</i>	+ 50.05
213	. . . . .	+19 24 17.9 <i>c</i>	- 7 14.8	110 <i>c</i>	9.999305	+ 6 36 46.67 <i>c</i>	+ 65.13
214	. . . . .	+41 19 31.3	-11 29.6	457	9.999390	- 4 37 10.80	- 45.53
215	. . . . .	+41 54 0	-11 31.3	8	9.999351	+ 4 44 20	+ 46.71
216	. . . . .	+42 39 27 <i>d</i>	-11 33.1	398	9.999350	- 0 54 56	- 9.02
217	. . . . .	+35 39 17.0 <i>c</i>	-10 58.3	25	9.999507	- 9 18 58.22 <i>c</i>	- 91.82
III	. . . . .	+43 39 46.0 <i>f</i>	-11 34.8	110 <i>c</i>	9.999311	+ 5 17 34.70 <i>f</i>	+ 52.17
219	Toronto, Canada	+43 40 0.8 <i>g</i>	-11 34.8	116 <i>g</i>	9.999313	+ 5 17 35.60 <i>g</i>	+ 52.17
220	. . . . .	+43 36 44.0	-11 34.7	104	9.999320	- 0 5 51.23	- 0.96
221	istria	+45 38 35.5 <i>h</i>	-11 35.5	68 <i>f</i>	9.999280	- 0 55 5.23 <i>h</i>	- 9.05
222	Triest, Austria	+45 38 45.4 <i>j</i>	-11 35.5	26 <i>f</i>	9.999257	- 0 55 3.0	- 9.04
223	Tschardjui, Turkestan .	+39 8 11.0 <i>d</i>	-11 20.7	188 <i>d</i>	9.999433	- 4 14 17.2 <i>d</i>	- 41.77
224	Tschardjui, Turkestan .	+39 8 10.7 <i>d</i>	-11 20.7	167	9.999431	- 4 13 57.3	- 41.72
225	Tulse Hill, England . .	+51 26 47	-11 18.6	48	9.999111	+ 0 0 27.7	+ 0.08
226	Turin, Italy	+45 2 16.3 <i>k</i>	-11 35.7	616 <i>k</i>	9.999313	- 0 31 5.96 <i>k</i>	- 5.11
227	Turin, Italy	+45 4 8.3 <i>c</i>	-11 35.7	276 <i>f</i>	9.999288	- 0 30 47.15 <i>c</i>	- 5.06
228	Tuscaloosa, Ala.	+33 12 36.8 <i>c</i>	-10 36.7	69	9.999568	+ 5 50 11.74 <i>c</i>	+ 57.53
III	Ukiah, Cal.	+39 8 12.1 <i>d</i>	-11 20.7	220 <i>d</i>	9.999435	+ 8 12 50.3 <i>d</i>	+ 80.86
230	Uppsala, Sweden	+59 51 29.4 <i>b</i>	-10 5.2	21 <i>b</i>	9.998909	- 1 10 30.12 <i>b</i>	- 11.58
231	Urbana, Ill.	+40 6 20.2 <i>l</i>	-11 25.2	236 <i>f</i>	9.999412	+ 5 52 53.90 <i>l</i>	+ 57.97
232	Utrecht, Netherlands . .	+52 5 9.7 <i>m</i>	-11 15.0	12 <i>m</i>	9.999093	- 0 20 31.0 <i>m</i>	- 3.37
233	Utrecht, Netherlands . .	+52 5 13	-11 15.0	23	9.999093	- 0 20 28.9	- 3.36
234	Venice, Italy	+45 26 10.5 <i>c</i>	-11 35.6	15 <i>c</i>	9.999261	- 0 49 22.12 <i>c</i>	- 8.11
III	Vienna, Austria	+48 13 55.1 <i>n</i>	-11 31.5	240 <i>f</i>	9.999205	- 1 5 21.35 <i>n</i>	- 10.74
236	Vienna, Austria	+48 12 35 5	-11 31.6	186 <i>f</i>	9.999202	- 1 5 31.61	- 10.76
237	Vienna, Austria	+48 12 53.8	-11 31.6	214	9.999204	- 1 5 25.17	- 10.75
238	Vienna, Austria	+48 12 46.7 <i>c</i>	-11 31.6	285	9.999209	- 1 5 10.96	- 10.71
239	Warsaw, Russia	+52 13 4.6 <i>c</i>	-11 14.3	121 <i>c</i>	9.999097	- 1 24 7.25 <i>c</i>	- 13.82
240	Washington, D. C.	+38 55 14.0 <i>o</i>	-11 19.6	82 <i>p</i>	9.999431	+ 5 8 15.78 <i>o</i>	+ 50.64
241	Washington, D. C.	+38 53 38.7 <i>q</i>	-11 19.4	31 <i>r</i>	9.999428	+ 5 8 12.15 <i>q</i>	+ 50.63
242	Washington, D. C.	+38 53 17.3 <i>r</i>	-11 19.4	10 <i>d</i>	9.999427	+ 5 8 8.24 <i>r</i>	+ 50.61
243	. . . . .	+38 56 14.8 <i>a</i>	-11 19.7	. . .	9.999428	+ 5 8 0.0 <i>a</i>	+ 50.60
244	. . . . .	+42 17 34.8	-11 32.3	61	9.999344	+ 4 45 12.7	+ 46.85
245	. . . . .	-41 17 3.8 <i>b</i>	+11 29.5	127 <i>b</i>	9.999376	-11 39 4.27 <i>b</i>	-114.84
246	. . . . .	+41 23 22.1	-11 29.9	170	9.999375	+ 4 55 50.55	+ 48.60
247	Wilhelmshaven, Germany	+53 31 52.1 <i>c</i>	-11 5.7	9 <i>c</i>	9.999057	- 0 32 35.06 <i>a</i>	- 5.35
III	Williams Bay, Wis.	+42 34 12.6 <i>s</i>	-11 33.0	320 <i>f</i>	9.999355	+ 5 54 13.24 <i>s</i>	+ 58.19
249	Williamstown, Mass. . . .	+42 42 30	-11 33.2	213	9.999344	+ 4 52 50	+ 48.10
250	Winchester, Mass.	+42 27 11	-11 32.7	30	9.999338	+ 4 44 32.4	+ 46.74
251	Windsor, N. S. W.	-33 36 30.8 <i>b</i>	+10 40.6	16 <i>r</i>	9.999556	-10 3 19.9	- 99.11
252	Zô-Sê, China	+31 5 48.0 <i>c</i>	-10 14.4	100 <i>c</i>	9.999619	- 8 4 44.82 <i>c</i>	- 79.63
253	Zurich, Switzerland . . .	+47 22 38.3 <i>c</i>	-11 33.5	469 <i>c</i>	9.999243	- 0 34 12.26 <i>c</i>	- 5.62

a Center of the clock room.
p Ground floor of main building.
s Small dome.
r Barometer.
a Sidostat pier.
t 40-inch equatorial.
u Intersection of equatorial axes.

f Main dome.
g Transit pier.

No.	Authority for—		Description.
	Latitude.	Longitude.	
202	Letter from Director, 1913.	<i>Washington Observations</i> , 1875.	Sayre Obs., Lehigh Univ.
203	<i>Amer. Jour. of Sci.</i> , 1883.	Letter from Director, 1913.	Williston Obs., Mt. Holyoke Coll.
204	Letter from Director, 1897.	<i>U. S. C. and G. S. Report</i> , 1897.	^a Washington University Obs.
205	<i>Astron. Nach.</i> , Nr. 2582, 1884.	<i>Astron. Nach.</i> , Nr. 2582, 1884.	Imperial University Obs.
206	Letter from Director, 1914.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. of Acad. of Sci.
207	Letter from Director, 1913.	<i>Monthly Notices, R. A. S.</i> , 1851.	Stonyhurst College Obs.
208	<i>Annalen der Sternw.</i> , 1896.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Univ. Obs.
209	Letter from Director, 1912.	Letter from Director, 1912.	Sproul Obs., Swarthmore College.
210	<i>Astron. Results</i> , 1879–81.	See footnote (b).	Government Observatory.
211	Letter from Director, 1891.	Letter from Director, 1891.	Syracuse Univ. Obs.
212	Letter from Director, 1914.	Letter from Director, 1914.	Roe Observatory.
213	<i>Boletin del Obs.</i> , 1914.	<i>Anuario del Obs.</i> , 1902.	National Observatory.
214	Letter from Director, 1897.	Letter from Director, 1897.	Tashkent Observatory.
215	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Mr. Metcalf's Obs., before 1911.
216	<i>Pubbl. dell'Osserv.</i> , 1900.	Letter from Director, 1913.	Collurania Observatory.
217	<i>Annales de l'Obs.</i> , 1894.	<i>Annales de l'Obs.</i> , 1894.	University Observatory.
218	Letter from Director, 1913.	Letter from Director, 1913.	University Observatory.
219	Letter from Director, 1912.	Letter from Director, 1912.	Meteorological Observatory.
220	<i>Annales de l'Obs.</i> , 1912.	<i>British Nautical Almanac</i> .	University Observatory.
221	Letter from Director, 1913.	Letter from Director, 1913.	^c Imperial and Royal Maritime Obs.
222	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	^d Imperial and Royal Maritime Obs.
223	<i>Astron. Nach.</i> , Nr. 4588, 1912.	Letter from Director, 1913.	International Lat. Obs., since 1909.
224	See footnote (e).	See footnote (i).	International Lat. Obs., before 1909.
225	<i>British Nautical Almanac</i> .	<i>British Nautical Almanac</i> .	Obs. of Sir W. Huggins, London.
226	Letter from Director, 1915.	Letter from Director, 1915.	^f Royal Obs. of the Univ., since 1913.
227	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	^g Royal Obs. of the Univ., before 1913.
228	Letter from Director, 1897.	Letter from Director, 1897.	Obs. Univ. of Ala.
229	See footnote (e).	Letter from Director, 1912.	International Lat. Obs.
230	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
231	Letter from Director, 1913.	Letter from Director, 1913.	Obs., Univ. of Ill.
232	Letter from Director, 1913.	Letter from Director, 1913.	University Obs., since 1855.
233	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	University Obs., before 1855.
234	Letter from Director, 1913.	Letter from Director, 1913.	Obs. of the Nautical Institute.
235	See footnote (h).	<i>Astron. Nach.</i> , Nr. 3993, 1905.	^e Imperial and Royal Univ. Obs.
236	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	^f Imperial and Royal Univ. Obs.
237	<i>Berliner Jahrbuch</i> .	<i>Berliner Jahrbuch</i> .	Oppolzer Obs., Josephstadt.
238	<i>Publik. der Sternw.</i> , 1892.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Kuffner Obs., Ottakring.
239	<i>Astron. Nach.</i> , Nr. 4666, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial University Obs.
240	<i>U. S. Naval Obs. Publications</i> , 1900.	<i>U. S. C. and G. S. Report</i> , 1897.	U. S. N. Obs., Georgetown Heights.
241	See footnote (m).	<i>U. S. C. and G. S. Report</i> , 1897.	U. S. Naval Obs., 1842–1893.
242	Letter from Director, 1912.	Letter from Director, 1912.	Smithsonian Astrophysical Obs.
243	<i>Astronomical Journal</i> , 1897.	<i>Astronomical Journal</i> , 1897.	Catholic Univ. Obs., Brookland.
244	Letter from Director, 1912.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Whitm Obs., Wellesley College.
245	<i>New Zealand Gazette</i> , May 7, 1914.	<i>New Zealand Gazette</i> , May 7, 1914.	Hector Observatory.
246	Letter from Director, 1891.	Letter from Director, 1891.	^k U. S. Military Academy.
247	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Naval Obs.
248	<i>Astrophysical Journal</i> , 1901.	<i>Astrophysical Journal</i> , 1901.	Yerkes Obs., Univ. of Chicago.
249	Letter from Director, 1893.	Letter from Director, 1893.	Field Memorial Obs., Williams Coll.
250	Letter from Director, 1913.	Letter from Director, 1913.	Mr. Metcalf's Obs., since 1911.
251	<i>Monthly Notices, R. A. S.</i> , 1884.	ⁿ <i>Monthly Notices, R. A. S.</i> , 1888.	Mr. John Tebbutt's Obs.
252	<i>Annales de l'Obs.</i> , 1907.	<i>Annales de l'Obs.</i> , 1907.	Obs. of the Jesuits near Shanghai.
253	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Obs. of Swiss Polytechnic School.

^a Old observatory 0°.125 E.^b Letter from Government Astronomer at Adelaide, 1913.^c Since 1898.^d Before 1898.^e *Resultate des Internationalen Breitendienstes*, 1900–1908.^f At Pino Torinese.^g At Palazzo Madama.^h *Astron. Arbeiten des K. K. Gradmessungs-Bureau*, 1896.ⁱ Since 1879.^j Before 1879.^k Old observatory 9' N., 1°.2 E.^l *Resultate des Internationalen Breitendienstes*, Band I, 1903.^m *Washington Observations for 1892*, Appendix I, pp. XXXI and XXXII.ⁿ And the new value of the longitude of Sydney.

THE COMPUTATION OF LUNAR DISTANCES.

Tables of lunar distances are no longer given in the Ephemeris, in accordance with the decision of the Navy Department that they are now of little practical use to navigators. However, in case it is desired to use this method, the angular distance between the Moon and any heavenly body may be calculated by solving the spherical triangle of which the known parts are the polar distances of the Moon and the other body and the difference of their right ascensions, or, in other words, the angle at the pole between their hour-circles. Then, the Greenwich mean time of the observation being approximately known, and the lunar distances for the star or other body calculated for the even hour before and after, the required lunar distance may be interpolated and the longitude derived by the methods given in books on navigation.

EXAMPLE 1.

Find the lunar distance of Aldebaran, Feb. 23, 1918, at 10 P. M., Greenwich Mean Time.

Let α and δ = Right Ascension and Declination of the star
 " α' and δ' = " " " " " " Moon
 " D = Lunar Distance

Also let $\tan M = \tan \delta' \sec (\alpha - \alpha')$
 Then $\cos D = \sin \delta' \cos (M - \delta) \operatorname{cosec} M$

$\alpha =$	$4^{\text{h}} 31^{\text{m}} 14^{\text{s}}.7$	$M =$	$31^{\circ} 15' 12''$
$\alpha' =$	$8^{\text{h}} 56^{\text{m}} 39^{\text{s}}.0$	$\delta =$	$+16^{\circ} 20' 46''$
$\alpha - \alpha' =$	$19^{\text{h}} 34^{\text{m}} 35^{\text{s}}.7$	$M - \delta =$	$14^{\circ} 54' 26''$
$\alpha - \alpha' =$	$293^{\circ} 38' 56''$	$\sin \delta' =$	9.373899
$\delta' =$	$+ 13^{\circ} 40' 56''$	$\cos (M - \delta) =$	9.985131
		$\operatorname{cosec} M =$	0.284981
$\tan \delta' =$	9.386401	$\cos D =$	9.644011
$\sec (\alpha - \alpha') =$	0.396714		
$\tan M =$	9.783115	D =	$63^{\circ} 51' 36''$

EXAMPLE 2.

Find the lunar distance of Jupiter Sept. 1, 1918, at noon, Greenwich Mean Time. In this case the distance is smaller and the following method is more accurate:

Let α and δ = Right Ascension and Declination of the planet
 " α' and δ' = " " " " " " Moon
 " D = Lunar Distance

Also let $\tan N = \tan \frac{1}{2} (\alpha - \alpha') \cos \frac{1}{2} (\delta + \delta') \operatorname{cosec} \frac{1}{2} (\delta - \delta')$
 Then $\sin \frac{1}{2} D = \sin \frac{1}{2} (\alpha - \alpha') \cos \frac{1}{2} (\delta + \delta') \operatorname{cosec} N$
 Sin N and $\sin \frac{1}{2} (\alpha - \alpha')$ have the same algebraic sign.

$\alpha =$	$6^{\text{h}} 43^{\text{m}} 30^{\text{s}}.6$	$\tan \frac{1}{2} (\alpha - \alpha') =$	9.078576π
$\alpha' =$	$7^{\text{h}} 38^{\text{m}} 10^{\text{s}}.6$	$\cos \frac{1}{2} (\delta + \delta') =$	9.970813
$\alpha - \alpha' =$	$23^{\text{h}} 5^{\text{m}} 20^{\text{s}}.0$	$\operatorname{cosec} \frac{1}{2} (\delta - \delta') =$	1.434281
$\alpha - \alpha' =$	$346^{\circ} 20' 0''$	$\tan N =$	0.483670π
$\delta =$	$+ 22^{\circ} 52' 48''$	N =	$108^{\circ} 10' 38''$
$\delta' =$	$+ 18^{\circ} 39' 48''$		
$\delta + \delta' =$	$+ 41^{\circ} 32' 36''$	$\sin \frac{1}{2} (\alpha - \alpha') =$	9.075480
$\delta - \delta' =$	$+ 4^{\circ} 13' 0''$	$\cos \frac{1}{2} (\delta + \delta') =$	9.970813
		$\operatorname{cosec} N =$	0.022233
$\frac{1}{2} (\alpha - \alpha') =$	$173^{\circ} 10' 0''$	$\sin \frac{1}{2} D =$	9.068526
$\frac{1}{2} (\delta + \delta') =$	$+ 20^{\circ} 46' 18''$	$\frac{1}{2} D =$	$6^{\circ} 43' 27''$
$\frac{1}{2} (\delta - \delta') =$	$+ 2^{\circ} 6' 30''$	D =	$13^{\circ} 26' 54''$

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1918.

Reduce the observed altitude of Polaris to the true altitude.
Reduce the recorded time of observation to the local sidereal time.
Take out the apparent right ascension and declination of Polaris for the time of observation.
Subtract the apparent right ascension from the local sidereal time of observation and the remainder is the hour-angle of Polaris.
With this hour-angle as the vertical argument, and the apparent declination of Polaris as the horizontal argument, take out the correction from Table I and add it to or subtract it from the true altitude, according to its sign.

For other altitudes than 45°, corrections taken from the supplementary table at the bottom of Table I (Table Ia) may be applied when necessary for the degree of accuracy required.

Example.—1918, August 5, at 10^h 40^m 30^s P. M. local mean solar time, in longitude 59° west of Greenwich, suppose the true altitude of Polaris to be 33° 20' 0'', required the latitude of the place.

Local astronomical mean time	h	m	s
	10	40	30
Reduction from Table III for 10 ^h 40 ^m 30 ^s		+ 1	45
Greenwich sidereal time of mean noon, August 5, page 10	8	52	54
Reduction from Table III, for longitude (−3 ^h 56 ^m west, or plus)		+ 0	39
Sum (having regard to signs) is equal to local sidereal time	19	35	48
R. A. of Polaris (page 281) for time of observation	1	31	36
Remainder is equal to hour-angle of Polaris	18	4	12
Decl. of Polaris (page 281) for time of observation, 88° 52' 1''	.	'	''
True altitude	+33	20	0
Correction from Table I		−0	34
Correction from Table Ia			−13
Latitude of the place	+33	19	13

Observations of Polaris for latitude should be made when practicable near the times of upper or of lower culminations (hour-angle 0^h or 12^h). However, at sea, if made near elongation (hour-angle 6^h or 18^h), the hour-angle, and hence the local time, should be known within one minute.

Decl. H. A.	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	88° 52' 40''	88° 52' 50''	Decl. H. A.
h m	' "	' "	' "	' "	' "	' "	h m
0 0	−68 0 0	−67 50 0	−67 40 0	−67 30 0	−67 20 0	−67 10 0	24 0
3	68 0 1	67 50 1	67 40 1	67 30 1	67 20 1	67 10 1	23 57
6	67 59 2	67 49 2	67 39 2	67 29 2	67 19 2	67 9 2	54
9	67 57 3	67 47 3	67 37 3	67 27 3	67 17 3	67 7 3	51
12	67 54 3	67 44 3	67 34 3	67 24 3	67 14 3	67 4 3	48
0 15	−67 51 4	−67 41 4	−67 31 4	−67 21 4	−67 11 4	−67 1 4	23 45
18	67 47 4	67 37 4	67 27 4	67 17 4	67 7 4	66 57 4	42
21	67 43 6	67 33 6	67 23 6	67 13 6	67 3 6	66 53 5	39
24	67 37 6	67 27 6	67 17 6	67 7 6	66 57 6	66 48 6	36
27	67 31 7	67 21 7	67 11 7	67 1 6	66 51 6	66 42 7	33
0 30	−67 24 7	−67 14 7	−67 4 7	−66 55 8	−66 45 8	−66 35 8	23 30
33	67 17 8	67 7 8	66 57 8	66 47 8	66 37 8	66 27 8	27
36	67 9 9	66 59 9	66 49 9	66 39 9	66 29 8	66 19 8	24
39	67 0 10	66 50 9	66 40 9	66 30 9	66 21 10	66 11 10	21
42	66 50 10	66 41 11	66 31 11	66 21 10	66 11 10	66 1 10	18
0 45	−66 40 11	−66 30 11	−66 20 11	−66 11 11	−66 1 11	−65 51 11	23 15
48	66 29 12	66 19 11	66 9 11	66 0 12	65 50 12	65 40 12	12
51	66 17 12	66 8 12	65 58 12	65 48 12	65 38 12	65 29 12	9
54	66 5 13	65 55 13	65 46 13	65 36 13	65 26 13	65 17 13	6
0 57	65 52 14	65 42 13	65 33 14	65 23 14	65 13 13	65 4 14	3
1 0	−65 38 14	−65 29 15	−65 19 14	−65 9 14	−65 0 15	−64 50 14	23 0
3	65 24 15	65 14 15	65 5 15	64 55 15	64 45 15	64 36 15	22 57
6	65 9 16	64 59 16	64 50 16	64 40 16	64 30 15	64 21 16	54
9	64 53 17	64 43 16	64 34 16	64 24 16	64 15 16	64 5 16	51
1 12	−64 36 17	−64 27 16	−64 18 16	−64 8 16	−63 59 16	−63 49 16	22 48

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1918.

Decl.		88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	88° 52' 40''	88° 52' 50''	Decl.	
H. A.								H. A.	
h	m	'	''	'	''	'	''	'	''
1	12	-64	36 17	-64	27 17	-64	18 18	-64	8 17
	15	64	19 17	64	10 18	64	0 17	63	51 18
	18	64	2 19	63	52 18	63	33 18	63	24 18
	21	63	43 19	63	34 18	63	15 18	63	6 18
	24	63	24 19	63	15 19	63	5 19	62	56 19
			20		20		20	62	47 20
1	27	-63	4 20	-62	55 21	-62	46 21	-62	36 20
	30	62	44 21	62	34 21	62	25 21	62	16 21
	33	62	23 22	62	13 21	62	4 22	61	55 22
	36	62	1 23	61	52 23	61	42 22	61	33 22
	39	61	38 23	61	29 23	61	20 23	61	11 23
1	42	-61	15 24	-61	6 24	-60	57 23	-60	48 23
	45	60	51 24	60	42 24	60	34 25	60	25 24
	48	60	27 25	60	18 24	60	9 25	60	1 24
	51	60	2 25	59	53 25	59	44 25	59	36 25
	54	59	37 27	59	28 26	59	19 26	59	10 26
1	57	-59	10 27	-59	2 27	-58	53 27	-58	44 26
2	0	58	43 27	58	35 28	58	26 27	58	18 28
	3	58	16 28	58	7 28	57	59 28	57	50 28
	6	57	48 28	57	39 28	57	31 28	57	22 28
	9	57	19 29	57	11 29	57	2 29	56	54 28
2	12	-56	50 30	-56	42 30	-56	33 29	-56	25 30
	15	56	20 30	56	12 31	56	4 31	55	55 30
	18	55	50 31	55	41 31	55	33 31	55	25 31
	21	55	19 32	55	10 31	55	2 31	54	54 31
	24	54	47 32	54	39 32	54	31 32	54	23 32
2	27	-54	15 33	-54	7 33	-53	59 33	-53	51 33
	30	53	42 33	53	34 33	53	26 33	53	18 33
	33	53	9 34	53	1 34	52	53 34	52	45 33
	36	52	35 34	52	27 34	52	19 34	52	12 34
	39	52	1 35	51	53 35	51	45 34	51	38 35
2	42	-51	26 36	-51	18 35	-51	11 36	-51	3 35
	45	50	50 36	50	43 36	50	35 36	50	28 36
	48	50	14 36	50	7 37	49	59 36	49	52 36
	51	49	38 37	49	30 37	49	23 36	49	16 36
	54	49	1 38	48	53 37	48	46 37	48	39 37
2	57	-48	23 38	-48	16 38	-48	9 38	-48	2 38
3	0	47	45 39	47	38 38	47	31 38	47	24 38
	3	47	6 39	47	0 39	46	53 39	46	46 39
	6	46	27 39	46	21 40	46	14 39	46	7 39
	9	45	48 40	45	41 40	45	35 40	45	28 40
3	12	-45	8 40	-45	1 40	-44	55 40	-44	48 40
	15	44	28 41	44	21 41	44	15 41	44	8 41
	18	43	47 41	43	40 41	43	34 41	43	27 41
	21	43	5 42	42	59 41	42	53 41	42	46 41
	24	42	23 42	42	17 42	42	11 42	42	5 42
3	27	-41	41 42	-41	35 42	-41	29 42	-41	23 42
	30	40	59 43	40	53 43	40	47 43	40	41 43
	33	40	16 44	40	10 44	40	4 43	39	58 43
	36	39	32 44	39	26 44	39	21 43	39	15 43
	39	38	48 44	38	42 44	38	37 44	38	31 44
3	42	-38	4 45	-37	58 44	-37	53 45	-37	47 44
	45	37	19 45	37	14 45	37	8 45	37	3 45
	48	36	34 46	36	29 46	36	23 45	36	18 45
	51	35	48 46	35	43 46	35	38 45	35	33 46
	54	35	3 46	34	58 46	34	53 46	34	47 45
3	57	-34	17 47	-34	12 47	-34	7 47	-34	2 47
4	0	33	30 47	33	25 47	33	20 47	33	15 47
	3	32	43 47	32	38 47	32	34 46	32	29 46
	6	31	56 47	31	51 47	31	47 47	31	42 47
4	9	-31	8 48	-31	4 47	-30	59 48	-30	55 47

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1918.

Decl. H. A.		88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	88° 52' 40''	88° 52' 50''	Decl. H. A.	
h	m	'	''	'	''	'	''	'	''
4	9	-31	8 48	-31	4 48	-30	59 47	-30	55 48
	12	30	20 48	30	16 48	30	12 48	30	7 48
	15	29	32 49	29	28 48	29	19 48	29	15 48
	18	28	43 48	28	40 49	28	31 48	28	27 48
	21	27	55 49	27	51 49	27	43 49	27	39 49
4	24	-27	6 49	-27	2 49	-26	58 49	-26	54 49
	27	26	17 50	26	13 49	26	5 49	26	1 49
	30	25	27 50	25	24 50	25	16 49	25	12 49
	33	24	37 50	24	34 50	24	27 50	24	23 49
	36	23	47 50	23	44 50	23	37 50	23	34 50
4	39	-22	57 51	-22	54 51	-22	50 50	-22	47 50
	42	22	6 51	22	3 50	21	57 51	21	54 50
	45	21	15 51	21	13 50	21	6 51	21	3 51
	48	20	24 51	20	22 51	20	16 50	20	13 50
	51	19	33 51	19	31 52	19	25 51	19	22 51
4	54	-18	42 52	-18	39 51	-18	37 52	-18	34 51
4	57	17	50 52	17	48 52	17	45 51	17	43 52
5	0	16	58 51	16	56 52	16	54 52	16	51 51
	3	16	7 52	16	4 52	16	2 52	16	0 51
	6	15	15 53	15	12 52	15	10 52	15	8 52
5	9	-14	22 52	-14	20 52	-14	18 52	-14	16 52
	12	13	30 53	13	28 52	13	26 52	13	24 52
	15	12	37 52	12	36 53	12	34 53	12	32 52
	18	11	45 53	11	43 53	11	41 52	11	40 53
	21	10	52 53	10	50 52	10	49 53	10	47 52
5	24	-	9 59 53	-	9 58 53	-	9 56 52	-	9 55 53
	27	9	6 53	9	5 53	9	4 52	9	2 53
	30	8	13 53	8	12 53	8	11 53	8	10 52
	33	7	20 53	7	19 53	7	18 53	7	17 53
	36	6	27 54	6	26 53	6	25 53	6	24 53
5	39	-	5 33 53	-	5 33 53	-	5 32 53	-	5 31 53
	42	4	40 53	4	40 54	4	39 53	4	38 53
	45	3	47 54	3	46 53	3	46 53	3	45 53
	48	2	53 53	2	53 53	2	53 53	2	52 53
	51	2	0 54	2	0 54	2	0 54	1	59 53
5	54	-	1 6 53	-	1 6 53	-	1 6 53	-	1 6 53
5	57	-	0 13 53	-	0 13 53	-	0 13 53	-	0 13 53
6	0	+	0 40 54	+	0 40 53	+	0 40 53	+	0 40 52
	3	1	34 54	1	33 53	1	33 53	1	32 52
	6	2	27 53	2	27 53	2	26 53	2	26 53
6	9	+	3 20 54	+	3 20 53	+	3 19 53	+	3 18 53
	12	4	14 53	4	13 53	4	12 53	4	11 53
	15	5	7 53	5	6 53	5	5 53	5	4 52
	18	6	0 53	5	59 53	5	58 53	5	57 53
	21	6	53 53	6	52 53	6	51 53	6	50 53
6	24	+	7 46 53	+	7 45 53	+	7 44 53	+	7 43 52
	27	8	39 53	8	38 53	8	37 52	8	35 52
	30	9	32 53	9	31 52	9	29 52	9	28 52
	33	10	25 53	10	23 52	10	22 52	10	20 52
	36	11	18 52	11	16 52	11	14 52	11	12 53
6	39	+12	10 53	+12	8 53	+12	6 53	+12	5 52
	42	13	3 52	13	1 52	12	59 52	12	57 51
	45	13	55 52	13	53 52	13	51 51	13	48 52
	48	14	47 52	14	45 52	14	42 51	14	40 52
	51	15	39 52	15	37 51	15	34 52	15	32 51
6	54	+16	31 51	+16	28 52	+16	26 51	+16	23 51
6	57	17	22 52	17	20 51	17	17 51	17	14 51
7	0	18	14 51	18	11 51	18	8 51	18	5 51
	3	19	5 51	19	2 51	18	59 51	18	56 51
7	6	+19	56 51	+19	53 51	+19	50 51	+19	47 51

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1918.

Decl. H. A.		88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	88° 52' 40''	88° 52' 50''	Decl. H. A.
h m		' "	' "	' "	' "	' "	' "	h m
7	6	+19 56 51	+19 53 51	+19 50 51	+19 47 50	+19 44 50	+19 41 50	16 54
	9	20 47 50	20 44 50	20 41 50	20 37 51	20 34 50	20 31 50	51
	12	21 37 51	21 34 50	21 31 50	21 28 50	21 24 50	21 21 50	48
	15	22 28 50	22 24 50	22 21 50	22 18 49	22 14 50	22 11 49	45
	18	23 18 50	23 14 50	23 11 50	23 7 50	23 4 49	23 0 50	42
7	21	+24 8 49	+24 4 50	+24 1 49	+23 57 49	+23 53 49	+23 50 49	16 39
	24	24 57 49	24 54 49	24 50 49	24 46 49	24 42 49	24 39 49	36
	27	25 47 49	25 43 49	25 39 49	25 35 49	25 31 49	25 28 48	33
	30	26 36 49	26 32 49	26 28 49	26 24 48	26 20 48	26 16 48	30
	33	27 25 48	27 21 48	27 17 48	27 12 49	27 8 48	27 4 48	27
7	36	+28 13 49	+28 9 48	+28 5 48	+28 1 48	+27 56 48	+27 52 48	16 24
	39	29 2 48	28 57 48	28 53 48	28 49 47	28 44 48	28 40 47	21
	42	29 50 47	29 45 48	29 41 48	29 36 47	29 32 48	29 27 47	18
	45	30 37 47	30 33 48	30 28 47	30 23 47	30 19 47	30 14 47	15
	48	31 24 47	31 20 47	31 15 47	31 10 47	31 6 46	31 1 46	12
7	51	+32 11 47	+32 7 46	+32 2 46	+31 57 46	+31 52 46	+31 47 46	16 9
	54	32 58 46	32 53 46	32 48 46	32 43 46	32 38 46	32 33 46	6
7	57	33 44 46	33 39 46	33 34 46	33 29 46	33 24 46	33 19 46	3
8	0	34 30 46	34 25 46	34 20 46	34 15 46	34 10 46	34 5 46	16 0
	3	35 16 45	35 11 45	35 6 45	35 0 45	34 55 45	34 50 44	15 57
8	6	+36 1 45	+35 56 45	+35 51 44	+35 45 45	+35 40 44	+35 34 45	15 54
	9	36 46 45	36 41 45	36 35 44	36 30 45	36 24 44	36 19 45	51
	12	37 31 44	37 25 44	37 19 44	37 14 44	37 8 44	37 3 44	48
	15	38 15 43	38 9 44	38 3 44	37 58 43	37 52 43	37 46 43	45
	18	38 58 44	38 53 43	38 47 43	38 41 43	38 35 43	38 29 43	42
8	21	+39 42 43	+39 36 43	+39 30 43	+39 24 43	+39 18 43	+39 12 43	15 39
	24	40 25 42	40 19 42	40 13 42	40 7 42	40 1 42	39 55 42	36
	27	41 7 42	41 1 42	40 55 42	40 49 42	40 43 42	40 37 42	33
	30	41 49 42	41 43 42	41 37 42	41 31 42	41 25 42	41 18 41	30
	33	42 31 41	42 25 41	42 18 41	42 12 41	42 6 41	41 59 41	27
8	36	+43 12 41	+43 6 41	+42 59 41	+42 53 40	+42 47 40	+42 40 40	15 24
	39	43 53 40	43 47 40	43 40 40	43 33 40	43 27 40	43 20 40	21
	42	44 33 40	44 27 40	44 20 40	44 13 40	44 7 39	44 0 40	18
	45	45 13 39	45 7 39	45 0 39	44 53 39	44 46 39	44 40 39	15
	48	45 52 39	45 46 39	45 39 39	45 32 39	45 25 39	45 19 38	12
8	51	+46 31 39	+46 25 38	+46 18 38	+46 11 38	+46 4 38	+45 57 38	15 9
	54	47 10 38	47 3 38	46 56 38	46 49 38	46 42 38	46 35 38	6
8	57	47 48 37	47 41 37	47 34 37	47 27 37	47 20 37	47 13 37	3
9	0	48 25 37	48 18 37	48 11 37	48 4 37	47 57 36	47 50 36	15 0
	3	49 2 37	48 55 36	48 48 36	48 41 36	48 33 36	48 26 36	14 57
9	6	+49 39 36	+49 31 36	+49 24 36	+49 17 36	+49 9 36	+49 2 36	14 54
	9	50 15 35	50 7 36	50 0 35	49 53 36	49 45 36	49 38 36	51
	12	50 50 35	50 43 35	50 35 35	50 28 34	50 20 35	50 13 34	48
	15	51 25 35	51 18 34	51 10 34	51 2 35	50 55 34	50 47 34	45
	18	52 0 34	51 52 34	51 44 34	51 37 33	51 29 33	51 21 34	42
9	21	+52 34 33	+52 26 33	+52 18 33	+52 10 33	+52 2 33	+51 55 33	14 39
	24	53 7 33	52 59 33	52 51 33	52 43 33	52 35 33	52 28 32	36
	27	53 40 32	53 32 32	53 24 32	53 16 32	53 8 32	53 0 32	33
	30	54 12 32	54 4 32	53 56 32	53 48 31	53 40 31	53 32 31	30
	33	54 44 31	54 36 31	54 28 31	54 19 31	54 11 31	54 3 31	27
9	36	+55 15 30	+55 7 30	+54 59 30	+54 50 31	+54 42 30	+54 34 30	14 24
	39	55 45 30	55 37 30	55 29 30	55 21 30	55 12 30	55 4 30	21
	42	56 15 30	56 7 30	55 59 29	55 51 29	55 42 29	55 34 29	18
	45	56 45 29	56 37 29	56 28 29	56 20 29	56 11 29	56 3 29	15
	48	57 14 28	57 6 28	56 57 28	56 49 28	56 40 28	56 32 28	12
9	51	+57 42 28	+57 34 27	+57 25 28	+57 17 27	+57 8 28	+57 0 27	14 9
	54	58 10 27	58 1 27	57 53 27	57 44 27	57 36 27	57 27 27	6
9	57	58 37 27	58 28 27	58 20 26	58 11 26	58 3 26	57 54 26	3
10	0	59 4 26	58 55 26	58 46 26	58 37 26	58 29 25	58 20 26	14 0
10	3	+59 30 26	+59 21 26	+59 12 26	+59 3 26	+58 54 25	+58 46 26	13 57

NDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1918.

88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	88° 52' 40''	88° 52' 50''	Decl. H. A.
' ''	' ''	' ''	' ''	' ''	' ''	h m
+59 30 25	+59 21 25	+59 12 25	+59 3 25	+58 54 25	+58 46 25	13 57
59 55 25	59 46 25	59 37 25	59 28 25	59 19 25	59 11 24	54
60 20 24	60 11 24	60 2 24	59 53 24	59 44 24	59 35 24	51
60 44 23	60 35 23	60 26 23	60 17 23	60 8 23	59 59 23	48
61 7 23	60 58 23	60 49 23	60 40 23	60 31 23	60 22 23	45
+61 30 22	+61 21 22	+61 12 22	+61 3 22	+60 54 22	+60 45 22	13 42
61 52 22	61 43 22	61 34 22	61 25 21	61 16 21	61 7 21	39
62 14 21	62 5 21	61 56 21	61 46 21	61 37 21	61 28 21	36
62 35 20	62 26 20	62 17 20	62 7 21	61 58 20	61 49 20	33
62 55 20	62 46 20	62 37 20	62 28 19	62 18 20	62 9 20	30
+63 15 19	+63 6 19	+62 57 19	+62 47 19	+62 38 19	+62 29 18	13 27
63 34 19	63 25 18	63 16 18	63 6 18	62 57 18	62 47 19	24
63 53 18	63 43 18	63 34 18	63 24 18	63 15 18	63 6 17	21
64 11 17	64 1 17	63 52 17	63 42 17	63 33 17	63 23 17	18
64 28 16	64 18 17	64 9 16	63 59 17	63 50 16	63 40 17	15
+64 44 16	+64 35 16	+64 25 16	+64 16 15	+64 6 16	+63 57 15	13 12
65 0 15	64 51 15	64 41 15	64 31 15	64 22 15	64 12 15	9
65 15 15	65 6 14	64 56 15	64 46 15	64 37 14	64 27 15	6
65 30 14	65 20 14	65 11 15	65 1 14	64 51 14	64 42 15	3
65 44 13	65 34 13	65 24 13	65 15 13	65 5 13	64 55 13	13 0
+65 57 12	+65 47 13	+65 38 12	+65 28 12	+65 18 13	+65 8 13	12 57
66 9 12	66 0 12	65 50 12	65 40 12	65 31 11	65 21 12	54
66 21 12	66 12 11	66 2 11	65 52 11	65 42 11	65 33 11	51
66 33 10	66 23 10	66 13 11	66 3 11	65 53 11	65 44 10	48
66 43 10	66 33 10	66 24 9	66 14 10	66 4 10	65 54 10	45
+66 53 9	+66 43 9	+66 33 9	+66 24 9	+66 14 9	+66 4 9	12 42
67 2 9	66 52 9	66 42 9	66 33 8	66 23 8	66 13 8	39
67 11 8	67 1 8	66 51 8	66 41 8	66 31 8	66 21 8	36
67 19 7	67 9 7	66 59 7	66 49 7	66 39 7	66 29 7	33
67 26 6	67 16 6	67 6 6	66 56 6	66 46 6	66 36 7	30
+67 32 6	+67 22 6	+67 12 6	+67 2 6	+66 52 6	+66 43 5	12 27
67 38 5	67 28 5	67 18 5	67 8 5	66 58 5	66 48 5	24
67 43 5	67 33 5	67 23 5	67 13 5	67 3 5	66 53 5	21
67 48 3	67 38 3	67 28 3	67 18 3	67 8 4	66 58 4	18
67 51 3	67 41 3	67 31 3	67 21 3	67 12 3	67 2 3	15
+67 54 3	+67 44 3	+67 34 3	+67 24 3	+67 15 2	+67 5 2	12 12
67 57 2	67 47 2	67 37 2	67 27 2	67 17 2	67 7 2	9
67 59 1	67 49 1	67 39 1	67 29 1	67 19 1	67 9 1	6
68 0 0	67 50 0	67 40 0	67 30 0	67 20 0	67 10 0	3
+68 0 0	+67 50 0	+67 40 0	+67 30 0	+67 20 0	+67 10 0	12 0

TABLE Ia.

le I has been computed for an altitude of 45°. For other altitudes, corrections taken following table may be applied when the desired degree of accuracy requires it.

Altitude.	10°	20°	30°	40°	50°	60°	70°	Altitude.	H. A.
h	"	"	"	"	"	"	"	h	h
12	0	0	0	0	0	0	0	12	24
11	- 2	- 2	- 1	0	+1	+ 2	+ 4	13	23
10	8	6	4	-2	2	7	17	14	22
9	16	13	8	3	4	15	35	15	21
8	25	19	13	5	6	22	52	16	20
7	31	24	16	6	7	27	65	17	19
6	-33	-25	-17	-6	+8	+29	+70	18	18

SIDEREAL INTO MEAN SOLAR TIME.

TO BE FROM A SIDEREAL TIME

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SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.

	8 ^h	9 ^h	10 ^h	11 ^h	12 ^h	13 ^h	14 ^h	15 ^h	For Seconds.	
m	m s	m s	m s	m s	m s	m s	m s	m s	s	s
0	1 18.636	1 28.466	1 38.296	1 48.125	1 57.955	2 7.784	2 17.614	2 27.443	0	0.000
1	1 18.800	1 28.630	1 38.459	1 48.289	1 58.119	2 7.948	2 17.778	2 27.607	1	0.003
2	1 18.964	1 28.794	1 38.623	1 48.453	1 58.282	2 8.112	2 17.941	2 27.771	2	0.005
3	1 19.128	1 28.958	1 38.787	1 48.617	1 58.446	2 8.276	2 18.105	2 27.935	3	0.008
4	1 19.292	1 29.121	1 38.951	1 48.780	1 58.610	2 8.440	2 18.269	2 28.099	4	0.011
5	1 19.456	1 29.285	1 39.115	1 48.944	1 58.774	2 8.603	2 18.433	2 28.263	5	0.014
6	1 19.619	1 29.449	1 39.279	1 49.108	1 58.938	2 8.767	2 18.597	2 28.426	6	0.016
7	1 19.783	1 29.613	1 39.442	1 49.272	1 59.101	2 8.931	2 18.761	2 28.590	7	0.019
8	1 19.947	1 29.777	1 39.606	1 49.436	1 59.265	2 9.095	2 18.924	2 28.754	8	0.022
9	1 20.111	1 29.940	1 39.770	1 49.600	1 59.429	2 9.259	2 19.088	2 28.918	9	0.025
10	1 20.275	1 30.104	1 39.934	1 49.763	1 59.593	2 9.423	2 19.252	2 29.082	10	0.027
11	1 20.439	1 30.268	1 40.098	1 49.927	1 59.757	2 9.586	2 19.416	2 29.245	11	0.030
12	1 20.602	1 30.432	1 40.261	1 50.091	1 59.921	2 9.750	2 19.580	2 29.409	12	0.033
13	1 20.766	1 30.596	1 40.425	1 50.255	2 0.084	2 9.914	2 19.744	2 29.573	13	0.035
14	1 20.930	1 30.760	1 40.589	1 50.419	2 0.248	2 10.078	2 19.907	2 29.737	14	0.038
15	1 21.094	1 30.923	1 40.753	1 50.583	2 0.412	2 10.242	2 20.071	2 29.901	15	0.041
16	1 21.258	1 31.087	1 40.917	1 50.746	2 0.576	2 10.405	2 20.235	2 30.065	16	0.044
17	1 21.422	1 31.251	1 41.081	1 50.910	2 0.740	2 10.569	2 20.399	2 30.228	17	0.046
18	1 21.585	1 31.415	1 41.244	1 51.074	2 0.904	2 10.733	2 20.563	2 30.392	18	0.049
19	1 21.749	1 31.579	1 41.408	1 51.238	2 1.067	2 10.897	2 20.727	2 30.556	19	0.052
20	1 21.913	1 31.743	1 41.572	1 51.402	2 1.231	2 11.061	2 20.890	2 30.720	20	0.055
21	1 22.077	1 31.906	1 41.736	1 51.565	2 1.395	2 11.225	2 21.054	2 30.884	21	0.057
22	1 22.241	1 32.070	1 41.900	1 51.729	2 1.559	2 11.388	2 21.218	2 31.048	22	0.060
23	1 22.404	1 32.234	1 42.064	1 51.893	2 1.723	2 11.552	2 21.382	2 31.211	23	0.063
24	1 22.568	1 32.398	1 42.227	1 52.057	2 1.887	2 11.716	2 21.546	2 31.375	24	0.066
25	1 22.732	1 32.562	1 42.391	1 52.221	2 2.050	2 11.880	2 21.709	2 31.539	25	0.068
26	1 22.896	1 32.726	1 42.555	1 52.385	2 2.214	2 12.044	2 21.873	2 31.703	26	0.071
27	1 23.060	1 32.889	1 42.719	1 52.548	2 2.378	2 12.208	2 22.037	2 31.867	27	0.074
28	1 23.224	1 33.053	1 42.883	1 52.712	2 2.542	2 12.371	2 22.201	2 32.031	28	0.076
29	1 23.387	1 33.217	1 43.047	1 52.876	2 2.706	2 12.535	2 22.365	2 32.194	29	0.079
30	1 23.551	1 33.381	1 43.210	1 53.040	2 2.869	2 12.699	2 22.529	2 32.358	30	0.082
31	1 23.715	1 33.545	1 43.374	1 53.204	2 3.033	2 12.863	2 22.692	2 32.522	31	0.085
32	1 23.879	1 33.708	1 43.538	1 53.368	2 3.197	2 13.027	2 22.856	2 32.686	32	0.087
33	1 24.043	1 33.872	1 43.702	1 53.531	2 3.361	2 13.191	2 23.020	2 32.850	33	0.090
34	1 24.207	1 34.036	1 43.866	1 53.695	2 3.525	2 13.354	2 23.184	2 33.013	34	0.093
35	1 24.370	1 34.200	1 44.029	1 53.859	2 3.689	2 13.518	2 23.348	2 33.177	35	0.096
36	1 24.534	1 34.364	1 44.193	1 54.023	2 3.852	2 13.682	2 23.512	2 33.341	36	0.098
37	1 24.698	1 34.528	1 44.357	1 54.187	2 4.016	2 13.846	2 23.675	2 33.505	37	0.101
38	1 24.862	1 34.691	1 44.521	1 54.351	2 4.180	2 14.010	2 23.839	2 33.669	38	0.104
39	1 25.026	1 34.855	1 44.685	1 54.514	2 4.344	2 14.173	2 24.003	2 33.833	39	0.106
40	1 25.190	1 35.019	1 44.849	1 54.678	2 4.508	2 14.337	2 24.167	2 33.996	40	0.109
41	1 25.353	1 35.183	1 45.012	1 54.842	2 4.672	2 14.501	2 24.331	2 34.160	41	0.112
42	1 25.517	1 35.347	1 45.176	1 55.006	2 4.835	2 14.665	2 24.495	2 34.324	42	0.115
43	1 25.681	1 35.511	1 45.340	1 55.170	2 4.999	2 14.829	2 24.658	2 34.488	43	0.117
44	1 25.845	1 35.674	1 45.504	1 55.333	2 5.163	2 14.993	2 24.822	2 34.652	44	0.120
45	1 26.009	1 35.838	1 45.668	1 55.497	2 5.327	2 15.156	2 24.986	2 34.816	45	0.123
46	1 26.172	1 36.002	1 45.832	1 55.661	2 5.491	2 15.320	2 25.150	2 34.979	46	0.126
47	1 26.336	1 36.166	1 45.995	1 55.825	2 5.655	2 15.484	2 25.314	2 35.143	47	0.128
48	1 26.500	1 36.330	1 46.159	1 55.989	2 5.818	2 15.648	2 25.477	2 35.307	48	0.131
49	1 26.664	1 36.493	1 46.323	1 56.153	2 5.982	2 15.812	2 25.641	2 35.471	49	0.134
50	1 26.828	1 36.657	1 46.487	1 56.316	2 6.146	2 15.976	2 25.805	2 35.635	50	0.137
51	1 26.992	1 36.821	1 46.651	1 56.480	2 6.310	2 16.139	2 25.969	2 35.798	51	0.139
52	1 27.155	1 36.985	1 46.815	1 56.644	2 6.474	2 16.303	2 26.133	2 35.962	52	0.142
53	1 27.319	1 37.149	1 46.978	1 56.808	2 6.637	2 16.467	2 26.297	2 36.126	53	0.145
54	1 27.483	1 37.313	1 47.142	1 56.972	2 6.801	2 16.631	2 26.460	2 36.290	54	0.147
55	1 27.647	1 37.476	1 47.306	1 57.136	2 6.965	2 16.795	2 26.624	2 36.454	55	0.150
56	1 27.811	1 37.640	1 47.470	1 57.299	2 7.129	2 16.959	2 26.788	2 36.618	56	0.153
57	1 27.975	1 37.804	1 47.634	1 57.463	2 7.293	2 17.122	2 26.952	2 36.781	57	0.156
58	1 28.138	1 37.968	1 47.797	1 57.627	2 7.457	2 17.286	2 27.116	2 36.945	58	0.158
59	1 28.302	1 38.132	1 47.961	1 57.791	2 7.620	2 17.450	2 27.280	2 37.109	59	0.161

TABLE II.

SIDEREAL INTO MEAN SOLAR TIME.
TO BE SUBTRACTED FROM A SIDEREAL TIME

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MEAN SOLAR INTO SIDEREAL TIME.
TO BE ADDED TO A MEAN TIME INTERVAL.

MEAN SOLAR INTO SIDEREAL TIME.
TO BE ADDED TO A MEAN TIME INTERVAL.

Mean Solar.	8 ^h	9 ^h	10 ^h	11 ^h	12 ^h	13 ^h	14 ^h	15 ^h	For Seconds.	
m	m s	m s	m s	m s	m s	m s	m s	m s	s	s
0	1 18.852	1 28.708	1 38.565	1 48.421	1 58.278	2 8.134	2 17.991	2 27.847	0	0.000
1	1 19.016	1 28.873	1 38.729	1 48.585	1 58.442	2 8.298	2 18.155	2 28.011	1	0.003
2	1 19.180	1 29.037	1 38.893	1 48.750	1 58.606	2 8.463	2 18.319	2 28.176	2	0.005
3	1 19.345	1 29.201	1 39.058	1 48.914	1 58.771	2 8.627	2 18.483	2 28.340	3	0.008
4	1 19.509	1 29.365	1 39.222	1 49.078	1 58.935	2 8.791	2 18.648	2 28.504	4	0.011
5	1 19.673	1 29.530	1 39.386	1 49.243	1 59.099	2 8.956	2 18.812	2 28.668	5	0.014
6	1 19.837	1 29.694	1 39.550	1 49.407	1 59.263	2 9.120	2 18.976	2 28.833	6	0.016
7	1 20.002	1 29.858	1 39.715	1 49.571	1 59.428	2 9.284	2 19.141	2 28.997	7	0.019
8	1 20.166	1 30.022	1 39.879	1 49.735	1 59.592	2 9.448	2 19.305	2 29.161	8	0.022
9	1 20.330	1 30.187	1 40.043	1 49.900	1 59.756	2 9.613	2 19.469	2 29.326	9	0.025
10	1 20.495	1 30.351	1 40.207	1 50.064	1 59.920	2 9.777	2 19.633	2 29.490	10	0.027
11	1 20.659	1 30.515	1 40.372	1 50.228	2 0.085	2 9.941	2 19.798	2 29.654	11	0.030
12	1 20.823	1 30.680	1 40.536	1 50.393	2 0.249	2 10.105	2 19.962	2 29.818	12	0.033
13	1 20.987	1 30.844	1 40.700	1 50.557	2 0.413	2 10.270	2 20.126	2 29.983	13	0.036
14	1 21.152	1 31.008	1 40.865	1 50.721	2 0.578	2 10.434	2 20.290	2 30.147	14	0.038
15	1 21.316	1 31.172	1 41.029	1 50.885	2 0.742	2 10.598	2 20.455	2 30.311	15	0.041
16	1 21.480	1 31.337	1 41.193	1 51.050	2 0.906	2 10.763	2 20.619	2 30.476	16	0.044
17	1 21.644	1 31.501	1 41.357	1 51.214	2 1.070	2 10.927	2 20.783	2 30.640	17	0.047
18	1 21.809	1 31.665	1 41.522	1 51.378	2 1.235	2 11.091	2 20.948	2 30.804	18	0.049
19	1 21.973	1 31.829	1 41.686	1 51.542	2 1.399	2 11.255	2 21.112	2 30.968	19	0.052
20	1 22.137	1 31.994	1 41.850	1 51.707	2 1.563	2 11.420	2 21.276	2 31.133	20	0.055
21	1 22.302	1 32.158	1 42.015	1 51.871	2 1.727	2 11.584	2 21.440	2 31.297	21	0.057
22	1 22.466	1 32.322	1 42.179	1 52.035	2 1.892	2 11.748	2 21.605	2 31.461	22	0.060
23	1 22.630	1 32.487	1 42.343	1 52.200	2 2.056	2 11.912	2 21.769	2 31.625	23	0.063
24	1 22.794	1 32.651	1 42.507	1 52.364	2 2.220	2 12.077	2 21.933	2 31.790	24	0.066
25	1 22.959	1 32.815	1 42.672	1 52.528	2 2.385	2 12.241	2 22.098	2 31.954	25	0.068
26	1 23.123	1 32.979	1 42.836	1 52.692	2 2.549	2 12.405	2 22.262	2 32.118	26	0.071
27	1 23.287	1 33.144	1 43.000	1 52.857	2 2.713	2 12.570	2 22.426	2 32.283	27	0.074
28	1 23.451	1 33.308	1 43.164	1 53.021	2 2.877	2 12.734	2 22.590	2 32.447	28	0.077
29	1 23.616	1 33.472	1 43.329	1 53.185	2 3.042	2 12.898	2 22.755	2 32.611	29	0.079
30	1 23.780	1 33.637	1 43.493	1 53.349	2 3.206	2 13.062	2 22.919	2 32.775	30	0.082
31	1 23.944	1 33.801	1 43.657	1 53.514	2 3.370	2 13.227	2 23.083	2 32.940	31	0.085
32	1 24.109	1 33.965	1 43.822	1 53.678	2 3.534	2 13.391	2 23.247	2 33.104	32	0.088
33	1 24.273	1 34.129	1 43.986	1 53.842	2 3.699	2 13.555	2 23.412	2 33.268	33	0.090
34	1 24.437	1 34.294	1 44.150	1 54.007	2 3.863	2 13.720	2 23.576	2 33.432	34	0.093
35	1 24.601	1 34.458	1 44.314	1 54.171	2 4.027	2 13.884	2 23.740	2 33.597	35	0.096
36	1 24.766	1 34.622	1 44.479	1 54.335	2 4.192	2 14.048	2 23.905	2 33.761	36	0.099
37	1 24.930	1 34.786	1 44.643	1 54.499	2 4.356	2 14.212	2 24.069	2 33.925	37	0.101
38	1 25.094	1 34.951	1 44.807	1 54.664	2 4.520	2 14.377	2 24.233	2 34.090	38	0.104
39	1 25.259	1 35.115	1 44.971	1 54.828	2 4.684	2 14.541	2 24.397	2 34.254	39	0.107
40	1 25.423	1 35.279	1 45.136	1 54.992	2 4.849	2 14.705	2 24.562	2 34.418	40	0.110
41	1 25.587	1 35.444	1 45.300	1 55.156	2 5.013	2 14.869	2 24.726	2 34.582	41	0.112
42	1 25.751	1 35.608	1 45.464	1 55.321	2 5.177	2 15.034	2 24.890	2 34.747	42	0.115
43	1 25.916	1 35.772	1 45.629	1 55.485	2 5.342	2 15.198	2 25.054	2 34.911	43	0.118
44	1 26.080	1 35.936	1 45.793	1 55.649	2 5.506	2 15.362	2 25.219	2 35.075	44	0.120
45	1 26.244	1 36.101	1 45.957	1 55.814	2 5.670	2 15.527	2 25.383	2 35.239	45	0.123
46	1 26.408	1 36.265	1 46.121	1 55.978	2 5.834	2 15.691	2 25.547	2 35.404	46	0.126
47	1 26.573	1 36.429	1 46.286	1 56.142	2 5.999	2 15.855	2 25.712	2 35.568	47	0.129
48	1 26.737	1 36.593	1 46.450	1 56.306	2 6.163	2 16.019	2 25.876	2 35.732	48	0.131
49	1 26.901	1 36.758	1 46.614	1 56.471	2 6.327	2 16.184	2 26.040	2 35.897	49	0.134
50	1 27.066	1 36.922	1 46.778	1 56.635	2 6.491	2 16.348	2 26.204	2 36.061	50	0.137
51	1 27.230	1 37.086	1 46.943	1 56.799	2 6.656	2 16.512	2 26.369	2 36.225	51	0.140
52	1 27.394	1 37.251	1 47.107	1 56.964	2 6.820	2 16.676	2 26.533	2 36.389	52	0.142
53	1 27.558	1 37.415	1 47.271	1 57.128	2 6.984	2 16.841	2 26.697	2 36.554	53	0.145
54	1 27.723	1 37.579	1 47.436	1 57.292	2 7.149	2 17.005	2 26.861	2 36.718	54	0.148
55	1 27.887	1 37.743	1 47.600	1 57.456	2 7.313	2 17.169	2 27.026	2 36.882	55	0.151
56	1 28.051	1 37.908	1 47.764	1 57.621	2 7.477	2 17.334	2 27.190	2 37.047	56	0.153
57	1 28.215	1 38.072	1 47.928	1 57.785	2 7.641	2 17.498	2 27.354	2 37.211	57	0.156
58	1 28.380	1 38.236	1 48.093	1 57.949	2 7.806	2 17.662	2 27.519	2 37.375	58	0.159
59	1 28.544	1 38.400	1 48.257	1 58.113	2 7.970	2 17.826	2 27.683	2 37.539	59	0.162

MEAN SOLAR INTO SIDEREAL TIME.
TO BE ADDED TO A MEAN TIME INTERVAL.

TABLE IV.

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1918.

[For hour angles 0^h to 12^h the star is west of north, and for hour angles 12^h to 24^h it is east of north.]

Lat. H. A.		10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat. H. A.		
h	m	°	'	°	'	°	'	°	'	°	'	h	m
0	0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	24	0
	10	0	3.0	0	3.1	0	3.3	0	3.4	0	3.5	23	50
	20	0	6.0	0	6.1	0	6.5	0	6.8	0	7.0		40
0	30	0	9.0	0	9.2	0	9.8	0	10.1	0	10.5	23	30
	40	0	12.0	0	12.2	0	13.0	0	13.4	0	14.0		20
	50	0	14.9	0	15.2	0	16.2	0	16.8	0	17.5		10
1	0	0	17.8	0	18.2	0	19.0	0	20.0	0	20.9	23	0
	10	0	20.7	0	21.2	0	22.1	0	23.3	0	24.3	22	50
	20	0	23.6	0	24.1	0	25.1	0	26.5	0	27.6		40
1	30	0	26.4	0	26.9	0	28.1	0	29.1	0	30.9	22	30
	40	0	29.1	0	29.7	0	31.1	0	32.1	0	34.1		20
	50	0	31.8	0	32.5	0	33.9	0	35.1	0	37.2		10
2	0	0	34.5	0	35.2	0	36.7	0	38.0	0	40.3	22	0
	10	0	37.0	0	37.8	0	39.5	0	40.8	0	43.3	21	50
	20	0	39.5	0	40.4	0	42.1	0	43.5	0	46.2		40
2	30	0	41.9	0	42.8	0	44.7	0	47.0	0	49.0	21	30
	40	0	44.3	0	45.2	0	47.2	0	48.7	0	51.8		20
	50	0	46.5	0	47.5	0	49.6	0	51.2	0	54.4		10
3	0	0	48.7	0	49.7	0	51.9	0	53.6	0	56.9	21	0
	10	0	50.8	0	51.8	0	54.1	0	55.9	0	59.3	20	50
	20	0	52.8	0	53.8	0	56.2	0	58.0	0	59.1		40
3	30	0	54.6	0	55.8	0	58.2	0	59.1	1	0.1	20	30
	40	0	56.4	0	57.6	0	59.2	1	0.1	1	1.0		20
	50	0	58.1	0	59.3	1	1.0	1	1.8	1	2.8		10
4	0	0	59.6	1	0.8	1	2.6	1	3.5	1	4.4	20	0
	10	1	1.0	1	2.3	1	4.1	1	5.0	1	6.0	19	50
	20	1	2.4	1	3.6	1	5.5	1	6.4	1	7.4		40
4	30	1	3.6	1	4.8	1	6.7	1	7.6	1	8.7	19	30
	40	1	4.6	1	5.9	1	7.8	1	8.9	1	9.8		20
	50	1	5.6	1	6.9	1	8.8	1	9.8	1	10.8		10
5	0	1	6.4	1	7.8	1	9.7	1	10.6	1	11.7	19	0
	10	1	7.1	1	8.5	1	10.4	1	11.4	1	12.4	18	50
	20	1	7.7	1	9.1	1	11.0	1	12.0	1	13.0		40
5	30	1	8.2	1	9.5	1	11.5	1	12.4	1	13.5	18	30
	40	1	8.5	1	9.8	1	11.8	1	12.7	1	13.8		20
	50	1	8.7	1	10.0	1	12.0	1	12.9	1	14.0		10
6	0	1	8.7	1	10.1	1	12.0	1	13.0	1	14.1	18	0
	10	1	8.6	1	10.0	1	11.9	1	12.9	1	14.0	17	50
	20	1	8.4	1	9.8	1	11.7	1	12.7	1	13.7		40
6	30	1	8.1	1	9.4	1	11.3	1	12.3	1	13.4	17	30
	40	1	7.6	1	8.9	1	10.8	1	11.8	1	12.8		20
	50	1	7.0	1	8.3	1	10.2	1	11.1	1	12.2		10
7	0	1	6.3	1	7.6	1	9.4	1	10.3	1	11.4	17	0
	10	1	5.5	1	6.7	1	8.5	1	9.4	1	10.5	16	50
	20	1	4.5	1	5.7	1	7.5	1	8.4	1	9.4		40
7	30	1	3.4	1	4.6	1	6.3	1	7.2	1	8.2	16	30
	40	1	2.2	1	3.4	1	5.1	1	5.9	1	6.9		20
	50	1	0.9	1	2.0	1	3.7	1	4.5	1	5.4		10
8	0	0	59.4	1	0.5	1	2.1	1	3.0	1	3.9	16	0
	10	0	57.8	0	58.9	1	0.5	1	1.3	1	2.2	15	50
	20	0	56.2	0	57.2	0	58.7	0	59.5	1	0.4		40
8	30	0	54.4	0	55.4	0	56.9	0	57.6	0	58.4	15	30
	40	0	52.5	0	53.5	0	54.9	0	55.6	0	56.4		20
	50	0	50.5	0	51.5	0	52.8	0	53.5	0	54.3		10
9	0	0	48.5	0	49.4	0	50.7	0	51.3	0	52.0	15	0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1918.

[For hour angles 0^h to 12^h the star is west of north, and for hour angles 12^h to 24^h it is east of north.]

Lat. H. A.		10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat. H. A.	
h	m	°	°	°	°	°	°	°	°	°	h	m
9	0	0 48.5	0 49.4	0 50.7	0 51.3	0 52.0	0 52.9	0 53.8	0 54.8	0 55.9	15	0
	10	0 46.3	0 47.1	0 48.4	0 49.0	0 49.7	0 50.5	0 51.4	0 52.3	0 53.4	14	50
	20	0 44.0	0 44.8	0 46.0	0 46.6	0 47.3	0 48.0	0 48.9	0 49.8	0 50.8		40
9	30	0 41.7	0 42.5	0 43.6	0 44.1	0 44.8	0 45.5	0 46.3	0 47.1	0 48.1	14	30
	40	0 39.3	0 40.0	0 41.1	0 41.6	0 42.2	0 42.8	0 43.6	0 44.4	0 45.3		20
	50	0 36.8	0 37.5	0 38.5	0 39.0	0 39.5	0 40.1	0 40.8	0 41.6	0 42.4		10
10	0	0 34.2	0 34.9	0 35.8	0 36.2	0 36.8	0 37.3	0 38.0	0 38.7	0 39.5	14	0
	10	0 31.6	0 32.2	0 33.0	0 33.4	0 33.9	0 34.5	0 35.1	0 35.7	0 36.4	13	50
	20	0 28.9	0 29.5	0 30.2	0 30.6	0 31.1	0 31.5	0 32.1	0 32.7	0 33.3		40
10	30	0 26.2	0 26.7	0 27.4	0 27.7	0 28.1	0 28.6	0 29.0	0 29.6	0 30.2	13	30
	40	0 23.4	0 23.8	0 24.5	0 24.8	0 25.1	0 25.5	0 26.0	0 26.4	0 27.0		20
	50	0 20.6	0 21.0	0 21.5	0 21.8	0 22.1	0 22.4	0 22.8	0 23.2	0 23.7		10
11	0	0 17.7	0 18.0	0 18.5	0 18.7	0 19.0	0 19.3	0 19.6	0 20.0	0 20.4	13	0
	10	0 14.8	0 15.1	0 15.5	0 15.7	0 15.9	0 16.1	0 16.4	0 16.7	0 17.1	12	50
	20	0 11.9	0 12.1	0 12.4	0 12.6	0 12.8	0 12.9	0 13.2	0 13.4	0 13.7		40
11	30	0 8.9	0 9.1	0 9.3	0 9.5	0 9.6	0 9.7	0 9.9	0 10.1	0 10.3	12	30
	40	0 6.0	0 6.1	0 6.2	0 6.3	0 6.4	0 6.5	0 6.6	0 6.7	0 6.9		20
	50	0 3.0	0 3.0	0 3.1	0 3.2	0 3.2	0 3.2	0 3.3	0 3.4	0 3.4		10
12	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12	0

Lat. H. A.		32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat. H. A.	
h	m	°	°	°	°	°	°	°	°	°	h	m
0	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24	0
	10	0 3.5	0 3.6	0 3.7	0 3.8	0 3.9	0 4.0	0 4.2	0 4.3	0 4.5	23	50
	20	0 7.0	0 7.2	0 7.4	0 7.6	0 7.8	0 8.1	0 8.4	0 8.7	0 9.0		40
0	30	0 10.5	0 10.8	0 11.1	0 11.4	0 11.7	0 12.1	0 12.5	0 13.0	0 13.5	23	30
	40	0 14.0	0 14.4	0 14.7	0 15.1	0 15.6	0 16.1	0 16.6	0 17.3	0 17.9		20
	50	0 17.5	0 17.9	0 18.4	0 18.9	0 19.4	0 20.1	0 20.7	0 21.5	0 22.3		10
1	0	0 20.9	0 21.4	0 21.9	0 22.6	0 23.2	0 24.0	0 24.8	0 25.7	0 26.7	23	0
	10	0 24.3	0 24.9	0 25.5	0 26.2	0 27.0	0 27.8	0 28.8	0 29.9	0 31.0	22	50
	20	0 27.6	0 28.3	0 29.0	0 29.8	0 30.7	0 31.6	0 32.7	0 34.0	0 35.3		40
1	30	0 30.9	0 31.6	0 32.4	0 33.3	0 34.3	0 35.4	0 36.6	0 38.0	0 39.5	22	30
	40	0 34.1	0 34.9	0 35.8	0 36.8	0 37.9	0 39.1	0 40.4	0 41.9	0 43.6		20
	50	0 37.2	0 38.1	0 39.1	0 40.2	0 41.4	0 42.7	0 44.2	0 45.8	0 47.6		10
2	0	0 40.3	0 41.3	0 42.3	0 43.5	0 44.8	0 46.2	0 47.8	0 49.6	0 51.5	22	0
	10	0 43.3	0 44.4	0 45.5	0 46.7	0 48.1	0 49.6	0 51.4	0 53.2	0 55.3	21	50
	20	0 46.2	0 47.3	0 48.5	0 49.9	0 51.4	0 53.0	0 54.8	0 56.8	0 59.0		40
2	30	0 49.0	0 50.2	0 51.5	0 52.9	0 54.5	0 56.2	0 58.1	1 0.3	1 2.6	21	30
	40	0 51.8	0 53.0	0 54.4	0 55.9	0 57.5	0 59.3	1 1.3	1 3.6	1 6.1		20
	50	0 54.4	0 55.7	0 57.1	0 58.7	1 0.4	1 2.3	1 4.4	1 6.8	1 9.4		10
3	0	0 56.9	0 58.3	0 59.7	1 1.4	1 3.2	1 5.2	1 7.4	1 9.9	1 12.6	21	0
	10	0 59.3	1 0.7	1 2.3	1 4.0	1 5.9	1 7.9	1 10.2	1 12.8	1 15.7	20	50
	20	1 1.6	1 3.1	1 4.7	1 6.4	1 8.4	1 10.5	1 12.9	1 15.6	1 18.6		40
3	30	1 3.8	1 5.3	1 6.9	1 8.8	1 10.8	1 13.0	1 15.5	1 18.2	1 21.3	20	30
	40	1 5.8	1 7.4	1 9.1	1 11.0	1 13.0	1 15.3	1 17.9	1 20.7	1 23.9		20
	50	1 7.7	1 9.3	1 11.1	1 13.0	1 15.2	1 17.5	1 20.1	1 23.0	1 26.3		10
4	0	1 9.5	1 11.2	1 13.0	1 14.9	1 17.1	1 19.6	1 22.2	1 25.2	1 28.5	20	0
	10	1 11.2	1 12.8	1 14.7	1 16.7	1 18.9	1 21.4	1 24.2	1 27.2	1 30.6	19	50
	20	1 12.7	1 14.4	1 16.3	1 18.3	1 20.6	1 23.1	1 25.9	1 29.0	1 32.5		40
4	30	1 14.1	1 15.8	1 17.7	1 19.8	1 22.1	1 24.7	1 27.5	1 30.7	1 34.2	19	30
	40	1 15.3	1 17.0	1 19.0	1 21.1	1 23.5	1 26.1	1 29.0	1 32.2	1 35.7		20
	50	1 16.4	1 18.2	1 20.1	1 22.3	1 24.7	1 27.3	1 30.2	1 33.5	1 37.1		10
5	0	1 17.3	1 19.1	1 21.1	1 23.3	1 25.7	1 28.4	1 31.3	1 34.6	1 38.2	19	0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1918.

[For hour angles 0^h to 12^h the star is west of north, and for hour angles 12^h to 24^h it is east of north.]

Lat. H. A.		32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat. H. A.	
h	m	°	°	°	°	°	°	°	°	°	h	m
5	0	1 17.3	1 19.1	1 21.1	1 23.3	1 25.7	1 28.4	1 31.3	1 34.6	1 38.2	19	0
	10	1 18.1	1 19.9	1 21.9	1 24.1	1 26.6	1 29.2	1 32.2	1 35.5	1 39.2	18	50
	20	1 18.7	1 20.6	1 22.6	1 24.8	1 27.2	1 29.9	1 32.9	1 36.3	1 40.0		40
5	30	1 19.2	1 21.1	1 23.1	1 25.3	1 27.8	1 30.5	1 33.5	1 36.8	1 40.6	18	30
	40	1 19.6	1 21.4	1 23.4	1 25.6	1 28.1	1 30.8	1 33.9	1 37.2	1 40.9		20
	50	1 19.8	1 21.6	1 23.6	1 25.8	1 28.3	1 31.0	1 34.1	1 37.4	1 41.1		10
6	0	1 19.8	1 21.6	1 23.6	1 25.9	1 28.3	1 31.1	1 34.1	1 37.4	1 41.1	18	0
	10	1 19.7	1 21.5	1 23.5	1 25.7	1 28.2	1 30.9	1 33.9	1 37.2	1 40.9	17	50
	20	1 19.4	1 21.2	1 23.2	1 25.4	1 27.9	1 30.6	1 33.5	1 36.9	1 40.5		40
6	30	1 19.0	1 20.8	1 22.8	1 25.0	1 27.4	1 30.1	1 33.0	1 36.3	1 40.0	17	30
	40	1 18.4	1 20.2	1 22.2	1 24.3	1 26.7	1 29.4	1 32.3	1 35.6	1 39.2		20
	50	1 17.7	1 19.5	1 21.4	1 23.6	1 25.9	1 28.6	1 31.5	1 34.7	1 38.3		10
7	0	1 16.8	1 18.6	1 20.5	1 22.6	1 25.0	1 27.6	1 30.4	1 33.6	1 37.1	17	0
	10	1 15.8	1 17.5	1 19.4	1 21.5	1 23.8	1 26.4	1 29.2	1 32.3	1 35.8	16	50
	20	1 14.7	1 16.3	1 18.2	1 20.3	1 22.5	1 25.1	1 27.8	1 30.9	1 34.3		40
7	30	1 13.4	1 15.0	1 16.8	1 18.9	1 21.1	1 23.6	1 26.3	1 29.3	1 32.6	16	30
	40	1 11.9	1 13.6	1 15.3	1 17.3	1 19.5	1 21.9	1 24.6	1 27.5	1 30.8		20
	50	1 10.4	1 12.0	1 13.7	1 15.6	1 17.8	1 20.1	1 22.7	1 25.6	1 28.8		10
8	0	1 8.7	1 10.2	1 11.9	1 13.8	1 15.9	1 18.2	1 20.7	1 23.5	1 26.6	16	0
	10	1 6.9	1 8.4	1 10.0	1 11.8	1 13.8	1 16.1	1 18.5	1 21.3	1 24.3	15	50
	20	1 4.9	1 6.4	1 8.0	1 9.7	1 11.7	1 13.8	1 16.2	1 18.9	1 21.8		40
8	30	1 2.8	1 4.2	1 5.8	1 7.5	1 9.4	1 11.5	1 13.8	1 16.3	1 19.2	15	30
	40	1 0.6	1 2.0	1 3.5	1 5.1	1 7.0	1 9.0	1 11.2	1 13.6	1 16.4		20
	50	0 58.3	0 59.6	1 1.1	1 2.6	1 4.4	1 6.3	1 8.5	1 10.8	1 13.5		10
9	0	0 55.9	0 57.2	0 58.5	1 0.1	1 1.7	1 3.6	1 5.6	1 7.9	1 10.4	15	0
	10	0 53.4	0 54.6	0 55.9	0 57.4	0 59.0	1 0.7	1 2.6	1 4.8	1 7.2	14	50
	20	0 50.8	0 51.9	0 53.2	0 54.6	0 56.1	0 57.7	0 59.6	1 1.6	1 3.9		40
9	30	0 48.1	0 49.2	0 50.3	0 51.6	0 53.1	0 54.6	0 56.4	0 58.3	1 0.5	14	30
	40	0 45.3	0 46.3	0 47.4	0 48.6	0 50.0	0 51.5	0 53.1	0 54.9	0 57.0		20
	50	0 42.4	0 43.4	0 44.4	0 45.5	0 46.8	0 48.2	0 49.7	0 51.4	0 53.3		10
10	0	0 39.5	0 40.3	0 41.3	0 42.4	0 43.5	0 44.8	0 46.3	0 47.8	0 49.6	14	0
	10	0 36.4	0 37.2	0 38.1	0 39.1	0 40.2	0 41.4	0 42.7	0 44.2	0 45.8	13	50
	20	0 33.3	0 34.1	0 34.9	0 35.8	0 36.8	0 37.9	0 39.1	0 40.4	0 41.9		40
10	30	0 30.2	0 30.9	0 31.6	0 32.4	0 33.3	0 34.3	0 35.4	0 36.6	0 37.9	13	30
	40	0 27.0	0 27.6	0 28.2	0 28.9	0 29.8	0 30.6	0 31.6	0 32.7	0 33.9		20
	50	0 23.7	0 24.2	0 24.8	0 25.4	0 26.2	0 26.9	0 27.8	0 28.7	0 29.8		10
11	0	0 20.4	0 20.9	0 21.4	0 21.9	0 22.5	0 23.2	0 23.9	0 24.7	0 25.6	13	0
	10	0 17.1	0 17.4	0 17.9	0 18.3	0 18.8	0 19.4	0 20.0	0 20.7	0 21.4	12	50
	20	0 13.7	0 14.0	0 14.3	0 14.7	0 15.1	0 15.5	0 16.0	0 16.6	0 17.2		40
11	30	0 10.3	0 10.5	0 10.8	0 11.0	0 11.3	0 11.7	0 12.0	0 12.5	0 12.9	12	30
	40	0 6.9	0 7.0	0 7.2	0 7.4	0 7.6	0 7.8	0 8.0	0 8.3	0 8.6		20
	50	0 3.4	0 3.5	0 3.6	0 3.7	0 3.8	0 3.9	0 4.0	0 4.2	0 4.3		10
12	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12	0

Lat. H. A.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H. A.	
h	m	°	°	°	°	°	°	°	°	°	h	m
0	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24	0
	10	0 4.5	0 4.7	0 4.9	0 5.1	0 5.4	0 5.7	0 6.1	0 6.3	0 6.5	23	50
	20	0 9.0	0 9.4	0 9.8	0 10.3	0 10.8	0 11.5	0 12.2	0 12.6	0 13.0		40
0	30	0 13.5	0 14.1	0 14.7	0 15.4	0 16.2	0 17.2	0 18.3	0 18.9	0 19.5	23	30
	40	0 17.9	0 18.7	0 19.6	0 20.5	0 21.6	0 22.9	0 24.3	0 25.1	0 26.0		20
	50	0 22.3	0 23.3	0 24.4	0 25.6	0 26.9	0 28.5	0 30.3	0 31.3	0 32.4		10
1	0	0 26.7	0 27.9	0 29.1	0 30.6	0 32.2	0 34.1	0 36.2	0 37.4	0 38.7	23	0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1918.

For hour angles 0^h to 12^h the star is west of north, and for hour angles 12^h to 24^h it is east of north.]

Lat. A.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H. A.
h	m	°	°	°	°	°	°	°	°	°	h m
1	0	0 26.7	0 27.9	0 29.1	0 30.6	0 32.2	0 34.1	0 36.2	0 37.4	0 38.7	23 0
	10	0 31.0	0 32.4	0 33.8	0 35.5	0 37.4	0 39.6	0 42.1	0 43.4	0 44.9	22 50
	20	0 35.3	0 36.8	0 38.5	0 40.4	0 42.5	0 45.0	0 47.8	0 49.4	0 51.1	40
1	30	0 39.5	0 41.2	0 43.0	0 45.2	0 47.6	0 50.3	0 53.5	0 55.2	0 57.1	22 30
	40	0 43.6	0 45.4	0 47.5	0 49.8	0 52.5	0 55.5	0 59.0	1 0.9	1 3.0	20
	50	0 47.6	0 49.6	0 51.9	0 54.4	0 57.3	1 0.6	1 4.4	1 6.5	1 8.8	10
2	0	0 51.5	0 53.7	0 56.2	0 58.9	1 2.0	1 5.6	1 9.7	1 12.0	1 14.4	22 0
	10	0 55.3	0 57.7	1 0.3	1 3.3	1 6.6	1 10.4	1 14.9	1 17.3	1 19.9	21 50
	20	0 59.0	1 1.5	1 4.3	1 7.5	1 11.1	1 15.1	1 19.9	1 22.4	1 25.2	40
2	30	1 2.6	1 5.3	1 8.2	1 11.6	1 15.4	1 19.7	1 24.7	1 27.4	1 30.4	21 30
	40	1 6.1	1 8.9	1 12.0	1 15.5	1 19.5	1 24.1	1 29.3	1 32.2	1 35.3	20
	50	1 9.4	1 12.4	1 15.6	1 19.3	1 23.5	1 28.3	1 33.8	1 36.8	1 40.1	10
3	0	1 12.6	1 15.7	1 19.1	1 23.0	1 27.3	1 32.3	1 38.0	1 41.2	1 44.6	21 0
	10	1 15.7	1 18.8	1 22.4	1 26.4	1 31.0	1 36.1	1 42.1	1 45.4	1 49.0	20 50
	20	1 18.6	1 21.8	1 25.5	1 29.7	1 34.4	1 39.8	1 46.0	1 49.4	1 53.1	40
3	30	1 21.3	1 24.7	1 28.5	1 32.8	1 37.7	1 43.3	1 49.6	1 53.2	1 57.0	20 30
	40	1 23.9	1 27.4	1 31.3	1 35.8	1 40.8	1 46.5	1 53.0	1 56.7	2 0.6	20
	50	1 26.3	1 29.9	1 34.0	1 38.5	1 43.7	1 49.5	1 56.2	2 0.0	2 4.0	10
4	0	1 28.5	1 32.2	1 36.4	1 41.0	1 46.3	1 52.3	1 59.2	2 3.0	2 7.1	20 0
	10	1 30.6	1 34.4	1 38.6	1 43.4	1 48.8	1 54.9	2 1.9	2 5.8	2 10.0	19 50
	20	1 32.5	1 36.4	1 40.7	1 45.5	1 51.0	1 57.3	2 4.4	2 8.4	2 12.7	40
4	30	1 34.2	1 38.1	1 42.5	1 47.4	1 53.0	1 59.4	2 6.6	2 10.7	2 15.0	19 30
	40	1 35.7	1 39.7	1 44.2	1 49.2	1 54.8	2 1.3	2 8.6	2 12.7	2 17.1	20
	50	1 37.1	1 41.1	1 45.6	1 50.7	1 56.4	2 2.9	2 10.4	2 14.5	2 19.0	10
5	0	1 38.2	1 42.3	1 46.9	1 52.0	1 57.8	2 4.3	2 11.8	2 16.0	2 20.5	19 0
	10	1 39.2	1 43.3	1 47.9	1 53.0	1 58.9	2 5.5	2 13.1	2 17.3	2 21.8	18 50
	20	1 40.0	1 44.1	1 48.7	1 53.9	1 59.8	2 6.4	2 14.0	2 18.3	2 22.8	40
5	30	1 40.6	1 44.7	1 49.3	1 54.5	2 0.4	2 7.1	2 14.7	2 19.0	2 23.5	18 30
	40	1 40.9	1 45.1	1 49.7	1 55.0	2 0.9	2 7.5	2 15.2	2 19.4	2 24.0	20
	50	1 41.1	1 45.3	1 49.9	1 55.2	2 1.1	2 7.7	2 15.4	2 19.6	2 24.2	10
6	0	1 41.1	1 45.3	1 49.9	1 55.1	2 1.0	2 7.7	2 15.3	2 19.5	2 24.1	18 0
	10	1 40.9	1 45.1	1 49.7	1 54.9	2 0.7	2 7.4	2 15.0	2 19.2	2 23.7	17 50
	20	1 40.5	1 44.7	1 49.2	1 54.4	2 0.2	2 6.9	2 14.4	2 18.6	2 23.1	40
6	30	1 40.0	1 44.1	1 48.6	1 53.7	1 59.5	2 6.1	2 13.5	2 17.7	2 22.2	17 30
	40	1 39.2	1 43.3	1 47.8	1 52.8	1 58.6	2 5.1	2 12.4	2 16.5	2 21.0	20
	50	1 38.3	1 42.3	1 46.7	1 51.7	1 57.4	2 3.8	2 11.1	2 15.2	2 19.5	10
7	0	1 37.1	1 41.1	1 45.5	1 50.4	1 56.0	2 2.3	2 9.5	2 13.5	2 17.8	17 0
	10	1 35.8	1 39.7	1 44.0	1 48.9	1 54.4	2 0.6	2 7.7	2 11.6	2 15.9	16 50
	20	1 34.3	1 38.1	1 42.4	1 47.2	1 52.6	1 58.7	2 5.7	2 9.5	2 13.7	40
7	30	1 32.6	1 36.4	1 40.6	1 45.3	1 50.6	1 56.6	2 3.4	2 7.2	2 11.3	16 30
	40	1 30.8	1 34.5	1 38.6	1 43.1	1 48.3	1 54.2	2 0.9	2 4.6	2 8.6	20
	50	1 28.8	1 32.4	1 36.4	1 40.8	1 45.9	1 51.6	1 58.2	2 1.8	2 5.7	10
8	0	1 26.6	1 30.1	1 34.0	1 38.3	1 43.3	1 48.8	1 55.2	1 58.7	2 2.5	16 0
	10	1 24.3	1 27.7	1 31.4	1 35.7	1 40.5	1 45.9	1 52.1	1 55.5	1 59.2	15 50
	20	1 21.8	1 25.1	1 28.7	1 32.8	1 37.5	1 42.7	1 48.7	1 52.0	1 55.6	40
8	30	1 19.2	1 22.3	1 25.9	1 29.8	1 34.3	1 39.4	1 45.2	1 48.4	1 51.8	15 30
	40	1 16.4	1 19.4	1 22.8	1 26.7	1 31.0	1 35.8	1 41.4	1 44.5	1 47.8	20
	50	1 13.5	1 16.4	1 19.6	1 23.3	1 27.5	1 32.1	1 37.5	1 40.5	1 43.6	10
9	0	1 10.4	1 13.2	1 16.3	1 19.8	1 23.8	1 28.3	1 33.4	1 36.3	1 39.3	15 0
	10	1 7.2	1 9.9	1 12.9	1 16.2	1 20.0	1 24.3	1 29.2	1 31.9	1 34.8	14 50
	20	1 3.9	1 6.5	1 9.3	1 12.5	1 16.1	1 20.1	1 24.8	1 27.3	1 30.1	40
9	30	1 0.5	1 2.9	1 5.6	1 8.6	1 12.0	1 15.8	1 20.2	1 22.6	1 25.2	14 30
	40	0 57.0	0 59.2	1 1.7	1 4.6	1 7.7	1 11.4	1 15.5	1 17.8	1 20.2	20
	50	0 53.3	0 55.4	0 57.8	1 0.4	1 3.4	1 6.8	1 10.7	1 12.8	1 15.1	10
10	0	0 49.6	0 51.6	0 53.8	0 56.2	0 59.0	1 2.1	1 5.7	1 7.7	1 9.8	14 0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1918.

[For hour angles 0^h to 12^h the star is west of north, and for hour angles 12^h to 24^h it is east of north.]

Lat. H. A.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H. A.	
h m		• ' /	• ' /	• ' /	• ' /	• ' /	• ' /	• ' /	• ' /	• ' /	h m	
10	0	0 49.6	0 51.6	0 53.8	0 56.2	0 59.0	1 2.1	1 5.7	1 7.7	1 9.8	14	0
	10	0 45.8	0 47.6	0 49.6	0 51.9	0 54.4	0 57.3	1 0.7	1 2.5	1 4.4	13	50
	20	0 41.9	0 43.5	0 45.4	0 47.5	0 49.8	0 52.4	0 55.5	0 57.2	0 58.9		40
10	30	0 37.9	0 39.4	0 41.1	0 43.0	0 45.1	0 47.4	0 50.2	0 51.7	0 53.3	13	30
	40	0 33.9	0 35.2	0 36.7	0 38.4	0 40.3	0 42.4	0 44.8	0 46.2	0 47.6		20
	50	0 29.8	0 30.9	0 32.2	0 33.7	0 35.4	0 37.2	0 39.4	0 40.6	0 41.9		10
11	0	0 25.6	0 26.6	0 27.8	0 29.0	0 30.4	0 32.0	0 33.9	0 34.9	0 36.0	13	0
	10	0 21.4	0 22.3	0 23.2	0 24.3	0 25.4	0 26.8	0 28.3	0 29.2	0 30.1	12	50
	20	0 17.2	0 17.9	0 18.6	0 19.5	0 20.4	0 21.5	0 22.7	0 23.4	0 24.1		40
11	30	0 12.9	0 13.4	0 14.0	0 14.6	0 15.3	0 16.2	0 17.1	0 17.6	0 18.1	12	30
	40	0 8.6	0 9.0	0 9.3	0 9.8	0 10.2	0 10.8	0 11.4	0 11.8	0 12.1		20
	50	0 4.3	0 4.5	0 4.7	0 4.9	0 5.1	0 5.4	0 5.7	0 5.9	0 6.1		10
12	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12	0

Lat. H. A.		62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat. H. A.	
h m		• ' /	• ' /	• ' /	• ' /	• ' /	• ' /	• ' /	• ' /	• ' /	h m	
0	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24	0
	10	0 6.5	0 6.8	0 7.0	0 7.3	0 7.6	0 7.9	0 8.3	0 8.7	0 9.1	23	50
	20	0 13.0	0 13.5	0 14.0	0 14.6	0 15.2	0 15.8	0 16.6	0 17.3	0 18.2		40
0	30	0 19.5	0 20.2	0 21.0	0 21.8	0 22.7	0 23.7	0 24.8	0 26.0	0 27.3	23	30
	40	0 26.0	0 26.9	0 27.9	0 29.0	0 30.2	0 31.5	0 33.0	0 34.5	0 36.3		20
	50	0 32.4	0 33.5	0 34.8	0 36.1	0 37.6	0 39.3	0 41.1	0 43.0	0 45.2		10
1	0	0 38.7	0 40.1	0 41.6	0 43.2	0 45.0	0 46.9	0 49.1	0 51.4	0 54.0	23	0
	10	0 44.9	0 46.5	0 48.3	0 50.2	0 52.2	0 54.5	0 57.0	0 59.7	1 2.7	22	50
	20	0 51.1	0 52.9	0 54.9	0 57.0	0 59.4	1 1.9	1 4.7	1 7.8	1 11.3		40
1	30	0 57.1	0 59.1	1 1.4	1 3.8	1 6.4	1 9.2	1 12.4	1 15.8	1 19.7	22	30
	40	1 3.0	1 5.3	1 7.7	1 10.4	1 13.2	1 16.4	1 19.9	1 23.7	1 27.9		20
	50	1 8.8	1 11.3	1 13.9	1 16.8	1 19.9	1 23.4	1 27.2	1 31.3	1 35.9		10
2	0	1 14.4	1 17.1	1 20.0	1 23.1	1 26.5	1 30.2	1 34.3	1 38.8	1 43.8	22	0
	10	1 19.9	1 22.8	1 25.9	1 29.2	1 32.8	1 36.8	1 41.2	1 46.0	1 51.4	21	50
	20	1 25.2	1 28.3	1 31.6	1 35.1	1 39.0	1 43.2	1 47.9	1 53.0	1 58.7		40
2	30	1 30.4	1 33.6	1 37.1	1 40.8	1 44.9	1 49.4	1 54.4	1 59.8	2 5.8	21	30
	40	1 35.3	1 38.7	1 42.4	1 46.3	1 50.7	1 55.4	2 0.6	2 6.3	2 12.6		20
	50	1 40.1	1 43.6	1 47.5	1 51.6	1 56.2	2 1.1	2 6.5	2 12.5	2 19.2		10
3	0	1 44.6	1 48.3	1 52.3	1 56.7	2 1.4	2 6.6	2 12.2	2 18.5	2 25.4	21	0
	10	1 49.0	1 52.8	1 57.0	2 1.5	2 6.4	2 11.8	2 17.6	2 24.1	2 31.3	20	50
	20	1 53.1	1 57.1	2 1.4	2 6.0	2 11.1	2 16.7	2 22.8	2 29.5	2 36.9		40
3	30	1 57.0	2 1.1	2 5.5	2 10.3	2 15.6	2 21.3	2 27.6	2 34.5	2 42.2	20	30
	40	2 0.6	2 4.8	2 9.4	2 14.3	2 19.8	2 25.7	2 32.2	2 39.3	2 47.1		20
	50	2 4.0	2 8.3	2 13.0	2 18.1	2 23.7	2 29.7	2 36.4	2 43.7	2 51.7		10
4	0	2 7.1	2 11.6	2 16.4	2 21.6	2 27.3	2 33.5	2 40.2	2 47.7	2 56.0	20	0
	10	2 10.0	2 14.6	2 19.5	2 24.8	2 30.6	2 36.9	2 43.8	2 51.4	2 59.8	19	50
	20	2 12.7	2 17.3	2 22.3	2 27.7	2 33.6	2 40.0	2 47.0	2 54.8	3 3.4		40
4	30	2 15.0	2 19.7	2 24.8	2 30.3	2 36.3	2 42.8	2 49.9	2 57.8	3 6.5	19	30
	40	2 17.1	2 21.9	2 27.0	2 32.6	2 38.6	2 45.3	2 52.5	3 0.5	3 9.3		20
	50	2 19.0	2 23.8	2 29.0	2 34.6	2 40.7	2 47.4	2 54.7	3 2.8	3 11.6		10
5	0	2 20.5	2 25.4	2 30.6	2 36.3	2 42.5	2 49.2	2 56.6	3 4.7	3 13.6	19	0
	10	2 21.8	2 26.7	2 32.0	2 37.7	2 43.9	2 50.7	2 58.1	3 6.3	3 15.3	18	50
	20	2 22.8	2 27.7	2 33.0	2 38.8	2 45.0	2 51.8	2 59.3	3 7.5	3 16.5		40
5	30	2 23.5	2 28.4	2 33.8	2 39.5	2 45.8	2 52.6	3 0.1	3 8.3	3 17.4	18	30
	40	2 24.0	2 28.9	2 34.2	2 40.0	2 46.3	2 53.1	3 0.6	3 8.8	3 17.8		20
	50	2 24.2	2 29.1	2 34.4	2 40.2	2 46.4	2 53.2	3 0.7	3 8.9	3 17.9		10
6	0	2 24.1	2 29.0	2 34.3	2 40.0	2 46.3	2 53.0	3 0.5	3 8.6	3 17.6	18	0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1918.

[For hour angles 0^h to 12^h the star is west of north, and for hour angles 12^h to 24^h it is east of north.]

Lat. H. A.		62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat. H. A.	
h m		° '	° '	° '	° '	° '	° '	° '	° '	° '	h m	
6	0	2 24.1	2 29.0	2 34.3	2 40.0	2 46.3	2 53.0	3 0.5	3 8.6	3 17.6	18	0
	10	2 23.7	2 28.6	2 33.9	2 39.6	2 45.8	2 52.5	2 59.9	3 8.0	3 17.0		50
	20	2 23.1	2 27.9	2 33.1	2 38.8	2 45.0	2 51.7	2 59.0	3 7.1	3 16.0		40
6	30	2 22.2	2 27.0	2 32.2	2 37.8	2 43.9	2 50.5	2 57.8	3 5.8	3 14.6	17	30
	40	2 21.0	2 25.7	2 30.9	2 36.4	2 42.5	2 49.1	2 56.3	3 4.2	3 12.8		20
	50	2 19.5	2 24.2	2 29.3	2 34.8	2 40.8	2 47.3	2 54.4	3 2.2	3 10.7		10
7	0	2 17.8	2 22.5	2 27.5	2 32.9	2 38.8	2 45.2	2 52.2	2 59.8	3 8.3	17	0
	10	2 15.9	2 20.5	2 25.4	2 30.7	2 36.5	2 42.8	2 49.7	2 57.2	3 5.5		50
	20	2 13.7	2 18.2	2 23.0	2 28.2	2 33.9	2 40.1	2 46.8	2 54.2	3 2.4		40
7	30	2 11.3	2 15.6	2 20.4	2 25.5	2 31.1	2 37.1	2 43.7	2 51.0	2 58.9	16	30
	40	2 8.6	2 12.9	2 17.5	2 22.5	2 27.9	2 33.8	2 40.3	2 47.4	2 55.2		20
	50	2 5.7	2 9.8	2 14.4	2 19.2	2 24.5	2 30.3	2 36.6	2 43.5	2 51.1		10
8	0	2 2.5	2 6.6	2 11.0	2 15.7	2 20.9	2 26.5	2 32.6	2 39.3	2 46.7	16	0
	10	1 59.2	2 3.1	2 7.4	2 12.0	2 17.0	2 22.4	2 28.4	2 34.9	2 42.0		50
	20	1 55.6	1 59.4	2 3.5	2 8.0	2 12.9	2 18.1	2 23.9	2 30.2	2 37.1		40
8	30	1 51.8	1 55.5	1 59.5	2 3.8	2 8.5	2 13.6	2 19.1	2 25.2	2 31.9	15	30
	40	1 47.8	1 51.4	1 55.2	1 59.4	2 3.9	2 8.8	2 14.1	2 20.0	2 26.4		20
	50	1 43.6	1 47.1	1 50.8	1 54.7	1 59.1	2 3.8	2 8.9	2 14.5	2 20.7		10
9	0	1 39.3	1 42.6	1 46.1	1 49.9	1 54.0	1 58.5	2 3.4	2 8.8	2 14.7	15	0
	10	1 34.8	1 37.9	1 41.2	1 44.9	1 48.8	1 53.1	1 57.8	2 2.9	2 8.5		50
	20	1 30.1	1 33.0	1 36.2	1 39.7	1 43.4	1 47.5	1 51.9	1 56.8	2 2.1		40
9	30	1 25.2	1 28.0	1 31.0	1 34.3	1 37.8	1 41.7	1 45.8	1 50.4	1 55.5	14	30
	40	1 20.2	1 22.9	1 25.7	1 28.8	1 32.1	1 35.7	1 39.6	1 43.9	1 48.6		20
	50	1 15.1	1 17.6	1 20.2	1 23.1	1 26.2	1 29.5	1 33.2	1 37.2	1 41.6		10
10	0	1 9.8	1 12.1	1 14.6	1 17.2	1 20.1	1 23.2	1 26.7	1 30.4	1 34.5	14	0
	10	1 4.4	1 6.5	1 8.8	1 11.3	1 13.9	1 16.8	1 20.0	1 23.4	1 27.2		50
	20	0 58.9	1 0.9	1 2.9	1 5.2	1 7.6	1 10.2	1 13.1	1 16.3	1 19.7		40
10	30	0 53.3	0 55.1	0 57.0	0 59.0	1 1.2	1 3.6	1 6.2	1 9.0	1 12.1	13	30
	40	0 47.6	0 49.2	0 50.9	0 52.7	0 54.6	0 56.8	0 59.1	1 1.6	1 4.4		20
	50	0 41.9	0 43.2	0 44.7	0 46.3	0 48.0	0 49.9	0 51.9	0 54.1	0 56.6		10
11	0	0 36.0	0 37.2	0 38.5	0 39.8	0 41.3	0 42.9	0 44.7	0 46.6	0 48.7	13	0
	10	0 30.1	0 31.1	0 32.2	0 33.3	0 34.5	0 35.9	0 37.3	0 38.9	0 40.7		50
	20	0 24.1	0 24.9	0 25.8	0 26.7	0 27.7	0 28.8	0 29.9	0 31.2	0 32.6		40
11	30	0 18.1	0 18.7	0 19.4	0 20.1	0 20.8	0 21.6	0 22.5	0 23.5	0 24.5	12	30
	40	0 12.1	0 12.5	0 12.9	0 13.4	0 13.9	0 14.4	0 15.0	0 15.7	0 16.4		20
	50	0 6.1	0 6.3	0 6.5	0 6.7	0 7.0	0 7.2	0 7.5	0 7.8	0 8.2		10
12	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12	0

TABLE IVa.

Table IV has been computed for a declination of 88° 52' 20". For other declinations of Polaris the correction given below should be applied to the Azimuth taken from Table IV.

Azimuth. Decl.		0'	20'	40'	60'	80'	100'	120'	140'	160'	180'	200'	Azimuth. Decl.	
° ' "		'	'	'	'	'	'	'	'	'	'	'	° ' "	
88	51 55	0.0	+0.1	+0.2	+0.4	+0.5	+0.6	+0.7	+0.8	+1.0	+1.1	+1.2	88	51 55
	88 52 0	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0		88 52 0
88	52 5	0.0	+0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	88	52 5
	88 52 10	0.0	0.0	+0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5		88 52 10
88	52 15	0.0	0.0	0.0	+0.1	+0.1	+0.1	+0.1	+0.2	+0.2	+0.2	+0.2	88	52 15
	88 52 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		88 52 20
88	52 25	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	88	52 25
	88 52 30	0.0	0.0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.5		88 52 30
88	52 35	0.0	-0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	88	52 35
	88 52 40	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0		88 52 40
88	52 45	0.0	-0.1	-0.2	-0.4	-0.5	-0.6	-0.7	-0.8	-1.0	-1.1	-1.2	88	52 45

AZIMUTH OF POLARS AT ELONGATION, 1915.

Lat.	Long.						Variation in—	
	52° 0'	52° 10'	52° 20'	52° 30'	52° 40'	52° 50'	Lat.	Alt.
10 0	1 9 29	1 8 52.8	1 8 42.6	1 8 32.5	1 8 22.3	1 8 12.2	-0.21	-1.01
10 20	1 9 7.3	1 8 57.1	1 8 46.9	1 8 36.8	1 8 26.6	1 8 16.4	0.22	1.02
10 40	1 9 11.8	1 9 1.6	1 8 51.4	1 8 41.2	1 8 31.0	1 8 20.9	0.23	1.02
11 0	1 9 16.4	1 9 6.2	1 8 56.0	1 8 45.8	1 8 35.6	1 8 25.4	0.23	1.02
11 20	1 9 21.2	1 9 11.0	1 9 9.8	1 8 50.6	1 8 40.4	1 8 30.2	0.24	1.02
11 40	1 9 26.1	1 9 15.9	1 9 5.7	1 8 55.5	1 8 45.2	1 8 35.0	-0.25	-1.02
12 0	1 9 31.2	1 9 20.9	1 9 10.7	1 9 0.5	1 8 50.3	1 8 40.0	0.26	1.02
12 20	1 9 36.4	1 9 26.2	1 9 15.9	1 9 5.7	1 8 55.5	1 8 45.2	0.26	1.02
12 40	1 9 41.8	1 9 31.5	1 9 21.3	1 9 11.0	1 9 0.8	1 8 50.5	0.27	1.03
13 0	1 9 47.3	1 9 37.1	1 9 26.8	1 9 16.5	1 9 6.3	1 8 56.0	0.28	1.03
13 20	1 9 53.0	1 9 42.8	1 9 32.5	1 9 22.2	1 9 11.9	1 9 1.6	-0.29	-1.03
13 40	1 9 58.9	1 9 48.6	1 9 38.3	1 9 28.0	1 9 17.7	1 9 7.4	0.30	1.03
14 0	1 10 4.9	1 9 54.6	1 9 44.3	1 9 34.0	1 9 23.7	1 9 13.4	0.30	1.03
14 20	1 10 11.1	1 10 0.8	1 9 50.5	1 9 40.1	1 9 29.8	1 9 19.5	0.31	1.03
14 40	1 10 17.4	1 10 7.1	1 9 56.8	1 9 46.4	1 9 36.1	1 9 25.8	0.32	1.03
15 0	1 10 23.9	1 10 13.6	1 10 3.2	1 9 52.9	1 9 42.5	1 9 32.2	+0.33	-1.03
15 20	1 10 30.6	1 10 20.2	1 10 9.9	1 9 59.5	1 9 49.1	1 9 38.8	0.34	1.04
15 40	1 10 37.4	1 10 27.1	1 10 16.7	1 10 6.3	1 9 55.9	1 9 45.5	0.34	1.04
16 0	1 10 44.4	1 10 34.0	1 10 23.6	1 10 13.2	1 10 2.8	1 9 52.4	0.35	1.04
16 20	1 10 51.6	1 10 41.2	1 10 30.8	1 10 20.3	1 10 9.9	1 9 59.5	0.36	1.04
16 40	1 10 58.9	1 10 48.5	1 10 38.1	1 10 27.6	1 10 17.2	1 10 6.8	+0.37	-1.04
17 0	1 11 6.4	1 10 56.0	1 10 45.5	1 10 35.1	1 10 24.6	1 10 14.2	0.38	1.04
17 20	1 11 14.1	1 11 3.6	1 10 53.2	1 10 42.7	1 10 32.2	1 10 21.7	0.39	1.05
17 40	1 11 22.0	1 11 11.5	1 11 1.0	1 10 50.5	1 10 40.0	1 10 29.5	0.40	1.05
18 0	1 11 30.0	1 11 19.5	1 11 9.0	1 10 58.5	1 10 47.9	1 10 37.4	0.40	1.05
18 20	1 11 38.2	1 11 27.7	1 11 17.1	1 11 6.6	1 10 56.1	1 10 45.5	+0.41	-1.05
18 40	1 11 46.6	1 11 36.0	1 11 25.5	1 11 14.9	1 11 4.4	1 10 53.8	0.42	1.06
19 0	1 11 55.1	1 11 44.5	1 11 34.0	1 11 23.4	1 11 12.8	1 11 2.2	0.43	1.06
19 20	1 12 3.9	1 11 53.3	1 11 42.7	1 11 32.1	1 11 21.5	1 11 10.9	0.44	1.06
19 40	1 12 12.8	1 12 2.2	1 11 51.5	1 11 40.9	1 11 30.3	1 11 19.7	0.45	1.06
20 0	1 12 21.9	1 12 11.2	1 12 0.6	1 11 50.0	1 11 39.3	1 11 28.7	+0.46	-1.06
20 20	1 12 31.2	1 12 20.5	1 12 9.8	1 11 59.2	1 11 48.5	1 11 37.8	0.47	1.07
20 40	1 12 40.7	1 12 30.0	1 12 19.3	1 12 8.6	1 11 57.9	1 11 47.2	0.48	1.07
21 0	1 12 50.3	1 12 39.6	1 12 28.9	1 12 18.2	1 12 7.5	1 11 56.8	0.48	1.07
21 20	1 13 0.2	1 12 49.4	1 12 38.7	1 12 28.0	1 12 17.2	1 12 6.5	0.49	1.07
21 40	1 13 10.2	1 12 59.5	1 12 48.7	1 12 37.9	1 12 27.2	1 12 16.4	+0.50	-1.08
22 0	1 13 20.5	1 13 9.7	1 12 58.9	1 12 48.1	1 12 37.3	1 12 26.5	0.51	1.08
22 20	1 13 30.9	1 13 20.1	1 13 9.3	1 12 58.5	1 12 47.7	1 12 36.9	0.52	1.08
22 40	1 13 41.6	1 13 30.7	1 13 19.9	1 13 9.0	1 12 58.2	1 12 47.4	0.53	1.08
23 0	1 13 52.4	1 13 41.5	1 13 30.7	1 13 19.8	1 13 8.9	1 12 58.1	0.54	1.09
23 20	1 14 3.4	1 13 52.6	1 13 41.7	1 13 30.8	1 13 19.9	1 13 9.0	+0.55	-1.09
23 40	1 14 14.7	1 14 3.8	1 13 52.9	1 13 42.0	1 13 31.0	1 13 20.1	0.56	1.09
24 0	1 14 26.2	1 14 15.2	1 14 4.3	1 13 53.3	1 13 42.4	1 13 31.4	0.57	1.10
24 20	1 14 37.9	1 14 26.9	1 14 15.9	1 14 4.9	1 13 53.9	1 13 43.0	0.58	1.10
24 40	1 14 49.7	1 14 38.7	1 14 27.7	1 14 16.7	1 14 5.7	1 13 54.7	0.60	1.10
25 0	1 15 1.8	1 14 50.8	1 14 39.8	1 14 28.7	1 14 17.7	1 14 6.7	+0.61	-1.10
25 20	1 15 14.2	1 15 3.1	1 14 52.0	1 14 41.0	1 14 29.9	1 14 18.8	0.62	1.11
25 40	1 15 26.7	1 15 15.6	1 15 4.5	1 14 53.4	1 14 42.3	1 14 31.2	0.63	1.11
26 0	1 15 39.5	1 15 28.4	1 15 17.2	1 15 6.1	1 14 55.0	1 14 43.8	0.64	1.11
26 20	1 15 52.5	1 15 41.3	1 15 30.2	1 15 19.0	1 15 7.8	1 14 56.7	0.65	1.12
26 40	1 16 5.7	1 15 54.5	1 15 43.3	1 15 32.1	1 15 20.9	1 15 9.8	+0.66	-1.12
27 0	1 16 19.2	1 16 7.9	1 15 56.7	1 15 45.5	1 15 34.3	1 15 23.1	0.68	1.12
27 20	1 16 32.9	1 16 21.6	1 16 10.3	1 15 59.1	1 15 47.8	1 15 36.6	0.69	1.13
27 40	1 16 46.8	1 16 35.5	1 16 24.2	1 16 12.9	1 16 1.6	1 15 50.3	0.70	1.13
28 0	1 17 1.0	1 16 49.6	1 16 38.3	1 16 27.0	1 16 15.7	1 16 4.3	0.71	1.13
28 20	1 17 15.4	1 17 4.0	1 16 52.7	1 16 41.3	1 16 29.9	1 16 18.6	+0.72	-1.14
28 40	1 17 30.1	1 17 18.7	1 17 7.3	1 16 55.9	1 16 44.5	1 16 33.1	0.74	1.14
29 0	1 17 45.0	1 17 33.5	1 17 22.1	1 17 10.7	1 16 59.2	1 16 47.8	0.75	1.14
29 20	1 18 0.2	1 17 48.7	1 17 37.2	1 17 25.7	1 17 14.3	1 17 2.8	0.76	1.15
29 40	1 18 15.6	1 18 4.1	1 17 52.6	1 17 41.0	1 17 29.5	1 17 18.0	0.77	1.15
30 0	1 18 31.3	1 18 19.7	1 18 8.2	1 17 56.6	1 17 45.1	1 17 33.5	+0.79	-1.16

AZIMUTH OF POLARIS AT ELONGATION, 1918.

ecl. /	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	88° 52' 40''	88° 52' 50''	Variation for—	
							1' of Lat.	1'' of δ .
'	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	"	"
0	1 18 31.3	1 18 19.7	1 18 8.2	1 17 56.6	1 17 45.1	1 17 33.5	+0.79	-1.16
10	1 18 39.2	1 18 27.7	1 18 16.1	1 18 4.5	1 17 53.0	1 17 41.4	0.80	1.16
20	1 18 47.2	1 18 35.7	1 18 24.1	1 18 12.5	1 18 0.9	1 17 49.3	0.80	1.16
30	1 18 55.3	1 18 43.7	1 18 32.1	1 18 20.5	1 18 8.9	1 17 57.3	0.81	1.16
40	1 19 3.5	1 18 51.8	1 18 40.2	1 18 28.6	1 18 17.0	1 18 5.3	0.82	1.16
50	1 19 11.7	1 19 0.0	1 18 48.4	1 18 36.8	1 18 25.1	1 18 13.5	+0.82	-1.16
0	1 19 20.0	1 19 8.3	1 18 56.6	1 18 45.0	1 18 33.3	1 18 21.6	0.83	1.17
10	1 19 28.3	1 19 16.6	1 19 4.9	1 18 53.3	1 18 41.6	1 18 29.9	0.83	1.17
20	1 19 36.8	1 19 25.0	1 19 13.3	1 19 1.6	1 18 49.9	1 18 38.2	0.84	1.17
30	1 19 45.3	1 19 33.5	1 19 21.8	1 19 10.1	1 18 58.3	1 18 46.6	0.85	1.17
40	1 19 53.8	1 19 42.1	1 19 30.3	1 19 18.6	1 19 6.8	1 18 55.1	+0.86	-1.17
50	1 20 2.5	1 19 50.7	1 19 38.9	1 19 27.2	1 19 15.4	1 19 3.6	0.86	1.18
0	1 20 11.2	1 19 59.4	1 19 47.6	1 19 35.8	1 19 24.0	1 19 12.2	0.87	1.18
10	1 20 19.9	1 20 8.1	1 19 56.3	1 19 44.5	1 19 32.7	1 19 20.9	0.88	1.18
20	1 20 28.8	1 20 17.0	1 20 5.1	1 19 53.3	1 19 41.5	1 19 29.6	0.88	1.18
30	1 20 37.7	1 20 25.9	1 20 14.0	1 20 2.2	1 19 50.3	1 19 38.4	+0.89	-1.19
40	1 20 46.7	1 20 34.9	1 20 23.0	1 20 11.1	1 19 59.2	1 19 47.3	0.90	1.19
50	1 20 55.8	1 20 43.9	1 20 32.0	1 20 20.1	1 20 8.2	1 19 56.3	0.90	1.19
0	1 21 5.0	1 20 53.1	1 20 41.1	1 20 29.2	1 20 17.3	1 20 5.4	0.91	1.19
10	1 21 14.2	1 21 2.3	1 20 50.3	1 20 38.4	1 20 26.4	1 20 14.5	0.92	1.19
20	1 21 23.5	1 21 11.5	1 20 59.6	1 20 47.6	1 20 35.6	1 20 23.7	+0.93	-1.20
30	1 21 32.9	1 21 20.9	1 21 8.9	1 20 56.9	1 20 44.9	1 20 32.9	0.94	1.20
40	1 21 42.4	1 21 30.3	1 21 18.3	1 21 6.3	1 20 54.3	1 20 42.3	0.94	1.20
50	1 21 51.9	1 21 39.9	1 21 27.8	1 21 15.8	1 21 3.7	1 20 51.7	0.95	1.20
0	1 22 1.5	1 21 49.5	1 21 37.4	1 21 25.3	1 21 13.3	1 21 1.2	0.96	1.21
10	1 22 11.2	1 21 59.1	1 21 47.0	1 21 34.9	1 21 22.9	1 21 10.8	+0.97	-1.21
20	1 22 21.0	1 22 8.9	1 21 56.8	1 21 44.6	1 21 32.5	1 21 20.4	0.98	1.21
30	1 22 30.9	1 22 18.7	1 22 6.6	1 21 54.4	1 21 42.3	1 21 30.2	0.98	1.21
40	1 22 40.8	1 22 28.6	1 22 16.5	1 22 4.3	1 21 52.2	1 21 40.0	0.99	1.22
50	1 22 50.8	1 22 38.6	1 22 26.5	1 22 14.3	1 22 2.1	1 21 49.9	1.00	1.22
0	1 23 0.9	1 22 48.7	1 22 36.5	1 22 24.3	1 22 12.1	1 21 59.9	+1.01	-1.22
10	1 23 11.1	1 22 58.9	1 22 46.6	1 22 34.4	1 22 22.2	1 22 9.9	1.02	1.22
20	1 23 21.4	1 23 9.1	1 22 56.9	1 22 44.6	1 22 32.3	1 22 20.1	1.03	1.23
30	1 23 31.7	1 23 19.5	1 23 7.2	1 22 54.9	1 22 42.6	1 22 30.3	1.04	1.23
40	1 23 42.2	1 23 29.9	1 23 17.6	1 23 5.3	1 22 52.9	1 22 40.6	1.04	1.23
50	1 23 52.7	1 23 40.4	1 23 28.0	1 23 15.7	1 23 3.4	1 22 51.0	+1.05	-1.23
0	1 24 3.3	1 23 51.0	1 23 38.6	1 23 26.2	1 23 13.9	1 23 1.5	1.06	1.24
10	1 24 14.0	1 24 1.6	1 23 49.3	1 23 36.9	1 23 24.5	1 23 12.1	1.07	1.24
20	1 24 24.8	1 24 12.4	1 24 0.0	1 23 47.6	1 23 35.2	1 23 22.8	1.08	1.24
30	1 24 35.7	1 24 23.3	1 24 10.8	1 23 58.4	1 23 45.9	1 23 33.5	1.08	1.24
40	1 24 46.7	1 24 34.2	1 24 21.7	1 24 9.3	1 23 56.8	1 23 44.3	+1.09	-1.25
50	1 24 57.7	1 24 45.2	1 24 32.7	1 24 20.2	1 24 7.8	1 23 55.3	1.11	1.25
0	1 25 8.9	1 24 56.4	1 24 43.9	1 24 31.3	1 24 18.8	1 24 6.3	1.12	1.25
10	1 25 20.1	1 25 7.6	1 24 55.1	1 24 42.5	1 24 29.9	1 24 17.4	1.12	1.25
20	1 25 31.5	1 25 18.9	1 25 6.3	1 24 53.8	1 24 41.2	1 24 28.6	1.13	1.26
30	1 25 42.9	1 25 30.3	1 25 17.7	1 25 5.1	1 24 52.5	1 24 39.9	+1.14	-1.26
40	1 25 54.5	1 25 41.8	1 25 29.2	1 25 16.5	1 25 3.9	1 24 51.3	1.15	1.26
50	1 26 6.1	1 25 53.4	1 25 40.8	1 25 28.1	1 25 15.4	1 25 2.8	1.16	1.27
0	1 26 17.8	1 26 5.1	1 25 52.4	1 25 39.7	1 25 27.0	1 25 14.3	1.17	1.27
10	1 26 29.6	1 26 16.9	1 26 4.2	1 25 51.5	1 25 38.7	1 25 26.0	1.18	1.27
20	1 26 41.5	1 26 28.8	1 26 16.0	1 26 3.3	1 25 50.5	1 25 37.8	+1.19	-1.27
30	1 26 53.5	1 26 40.8	1 26 28.0	1 26 15.2	1 26 2.4	1 25 49.7	1.20	1.28
40	1 27 5.7	1 26 52.9	1 26 40.0	1 26 27.2	1 26 14.4	1 26 1.6	1.21	1.28
50	1 27 17.9	1 27 5.0	1 26 52.2	1 26 39.4	1 26 26.5	1 26 13.7	1.22	1.28
0	1 27 30.2	1 27 17.3	1 27 4.5	1 26 51.6	1 26 38.7	1 26 25.9	1.23	1.29
10	1 27 42.6	1 27 29.7	1 27 16.8	1 27 3.9	1 26 51.0	1 26 38.1	+1.24	-1.29
20	1 27 55.1	1 27 42.2	1 27 29.3	1 27 16.4	1 27 3.4	1 26 50.5	1.25	1.29
30	1 28 7.8	1 27 54.8	1 27 41.9	1 27 28.9	1 27 15.9	1 27 3.0	1.26	1.30
40	1 28 20.5	1 28 7.5	1 27 54.5	1 27 41.5	1 27 28.5	1 27 15.5	1.27	1.30
50	1 28 33.4	1 28 20.3	1 28 7.3	1 27 54.3	1 27 41.3	1 27 28.2	1.28	1.30
0	1 28 46.3	1 28 33.2	1 28 20.2	1 28 7.1	1 27 54.1	1 27 41.0	+1.29	-1.31

AZIMUTH OF POLARIS AT ELONGATION, 1918.

Decl. Lat.		88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	88° 52' 40''	88° 52' 50''	Variation for—	
								1' of Lat.	1'' of L.
	• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	"	"
40	0	1 28 46.3	1 28 33.2	1 28 20.2	1 28 7.1	1 27 54.1	1 27 41.0	+1.29	-1.31
40	10	1 28 59.4	1 28 46.3	1 28 33.2	1 28 20.1	1 28 7.0	1 27 53.9	1.30	1.31
40	20	1 29 12.5	1 28 59.4	1 28 46.3	1 28 33.2	1 28 20.0	1 28 6.9	1.31	1.32
40	30	1 29 25.8	1 29 12.7	1 28 59.5	1 28 46.4	1 28 33.2	1 28 20.0	1.32	1.32
40	40	1 29 39.2	1 29 26.0	1 29 12.8	1 28 59.6	1 28 46.5	1 28 33.3	1.34	1.32
40	50	1 29 52.7	1 29 39.5	1 29 26.3	1 29 13.0	1 28 59.8	1 28 46.6	+1.35	-1.32
41	0	1 30 6.3	1 29 53.1	1 29 39.8	1 29 26.6	1 29 13.3	1 29 0.1	1.36	1.32
41	10	1 30 20.1	1 30 6.8	1 29 53.5	1 29 40.2	1 29 26.9	1 29 13.6	1.37	1.33
41	20	1 30 33.9	1 30 20.6	1 30 7.3	1 29 53.9	1 29 40.6	1 29 27.3	1.38	1.33
41	30	1 30 47.9	1 30 34.5	1 30 21.2	1 30 7.8	1 29 54.4	1 29 41.1	1.40	1.34
41	40	1 31 2.0	1 30 48.6	1 30 35.2	1 30 21.8	1 30 8.4	1 29 55.0	+1.41	-1.34
41	50	1 31 16.2	1 31 2.7	1 30 49.3	1 30 35.9	1 30 22.5	1 30 9.0	1.42	1.34
42	0	1 31 30.5	1 31 17.0	1 31 3.6	1 30 50.1	1 30 36.6	1 30 23.2	1.43	1.35
42	10	1 31 44.9	1 31 31.4	1 31 17.9	1 31 4.4	1 30 50.9	1 30 37.4	1.44	1.35
42	20	1 31 59.5	1 31 46.0	1 31 32.4	1 31 18.9	1 31 5.4	1 30 51.8	1.46	1.35
42	30	1 32 14.2	1 32 0.6	1 31 47.0	1 31 33.5	1 31 19.9	1 31 6.3	+1.47	-1.36
42	40	1 32 29.0	1 32 15.4	1 32 1.8	1 31 48.2	1 31 34.6	1 31 21.0	1.48	1.36
42	50	1 32 43.9	1 32 30.3	1 32 16.7	1 32 3.0	1 31 49.4	1 31 35.7	1.49	1.36
43	0	1 32 59.0	1 32 45.3	1 32 31.7	1 32 18.0	1 32 4.3	1 31 50.6	1.50	1.37
43	10	1 33 14.2	1 33 0.5	1 32 46.8	1 32 33.1	1 32 19.4	1 32 5.6	1.52	1.37
43	20	1 33 29.5	1 33 15.8	1 33 2.0	1 32 48.3	1 32 34.5	1 32 20.8	+1.53	-1.37
43	30	1 33 45.0	1 33 31.2	1 33 17.4	1 33 3.6	1 32 49.9	1 32 36.1	1.54	1.38
43	40	1 34 0.6	1 33 46.8	1 33 33.0	1 33 19.1	1 33 5.3	1 32 51.5	1.56	1.38
43	50	1 34 16.3	1 34 2.5	1 33 48.6	1 33 34.7	1 33 20.9	1 33 7.0	1.57	1.39
44	0	1 34 32.2	1 34 18.3	1 34 4.4	1 33 50.5	1 33 36.6	1 33 22.7	1.58	1.39
44	10	1 34 48.2	1 34 34.3	1 34 20.3	1 34 6.4	1 33 52.4	1 33 38.5	+1.60	-1.39
44	20	1 35 4.4	1 34 50.4	1 34 36.4	1 34 22.4	1 34 8.4	1 33 54.4	1.61	1.40
44	30	1 35 20.7	1 35 6.6	1 34 52.6	1 34 38.6	1 34 24.6	1 34 10.5	1.63	1.40
44	40	1 35 37.1	1 35 23.0	1 35 9.0	1 34 54.9	1 34 40.8	1 34 26.8	1.64	1.41
44	50	1 35 53.6	1 35 39.5	1 35 25.4	1 35 11.3	1 34 57.2	1 34 43.1	1.65	1.41
45	0	1 36 10.4	1 35 56.2	1 35 42.1	1 35 27.9	1 35 13.8	1 34 59.6	+1.67	-1.41
45	10	1 36 27.2	1 36 13.0	1 35 58.9	1 35 44.7	1 35 30.5	1 35 16.3	1.68	1.42
45	20	1 36 44.2	1 36 30.0	1 36 15.8	1 36 1.6	1 35 47.3	1 35 33.1	1.70	1.42
45	30	1 37 1.4	1 36 47.1	1 36 32.9	1 36 18.6	1 36 4.3	1 35 50.1	1.71	1.43
45	40	1 37 18.7	1 37 4.4	1 36 50.1	1 36 35.8	1 36 21.5	1 36 7.2	1.73	1.43
45	50	1 37 36.2	1 37 21.8	1 37 7.5	1 36 53.1	1 36 38.8	1 36 24.4	+1.74	-1.44
46	0	1 37 53.8	1 37 39.4	1 37 25.0	1 37 10.6	1 36 56.2	1 36 41.8	1.76	1.44
46	10	1 38 11.6	1 37 57.1	1 37 42.7	1 37 28.3	1 37 13.8	1 36 59.4	1.77	1.44
46	20	1 38 29.5	1 38 15.0	1 38 0.5	1 37 46.1	1 37 31.6	1 37 17.1	1.79	1.45
46	30	1 38 47.6	1 38 33.1	1 38 18.5	1 38 4.0	1 37 49.5	1 37 35.0	1.80	1.45
46	40	1 39 5.9	1 38 51.3	1 38 36.7	1 38 22.1	1 38 7.6	1 37 53.0	+1.82	-1.46
46	50	1 39 24.3	1 39 9.7	1 38 55.0	1 38 40.4	1 38 25.8	1 38 11.2	1.84	1.46
47	0	1 39 42.9	1 39 28.2	1 39 13.5	1 38 58.9	1 38 44.2	1 38 29.5	1.86	1.47
47	10	1 40 1.6	1 39 46.9	1 39 32.2	1 39 17.5	1 39 2.8	1 38 48.0	1.87	1.47
47	20	1 40 20.5	1 40 5.8	1 39 51.0	1 39 36.3	1 39 21.5	1 39 6.7	1.88	1.48
47	30	1 40 39.6	1 40 24.8	1 40 10.0	1 39 55.2	1 39 40.4	1 39 25.6	+1.90	-1.48
47	40	1 40 58.9	1 40 44.0	1 40 29.2	1 40 14.3	1 39 59.5	1 39 44.6	1.92	1.49
47	50	1 41 18.3	1 41 3.4	1 40 48.5	1 40 33.6	1 40 18.7	1 40 3.8	1.94	1.49
48	0	1 41 38.0	1 41 23.0	1 41 8.1	1 40 53.1	1 40 38.2	1 40 23.2	1.96	1.50
48	10	1 41 57.8	1 41 42.8	1 41 27.8	1 41 12.8	1 40 57.8	1 40 42.8	1.98	1.50
48	20	1 42 17.7	1 42 2.7	1 41 47.6	1 41 32.6	1 41 17.5	1 41 2.5	+1.99	-1.50
48	30	1 42 37.9	1 42 22.8	1 42 7.7	1 41 52.6	1 41 37.5	1 41 22.4	2.01	1.51
48	40	1 42 58.2	1 42 43.1	1 42 27.9	1 42 12.8	1 41 57.7	1 41 42.5	2.03	1.51
48	50	1 43 18.8	1 43 3.6	1 42 48.4	1 42 33.2	1 42 18.0	1 42 2.8	2.05	1.52
49	0	1 43 39.5	1 43 24.2	1 43 9.0	1 42 53.8	1 42 38.5	1 42 23.3	2.07	1.52
49	10	1 44 0.4	1 43 45.1	1 43 29.8	1 43 14.5	1 42 59.2	1 42 43.9	+2.09	-1.53
49	20	1 44 21.5	1 44 6.2	1 43 50.8	1 43 35.5	1 43 20.1	1 43 4.8	2.11	1.53
49	30	1 44 42.8	1 44 27.4	1 44 12.0	1 43 56.6	1 43 41.2	1 43 25.8	2.13	1.54
49	40	1 45 4.3	1 44 48.9	1 44 33.4	1 44 18.0	1 44 2.5	1 43 47.1	2.15	1.54
49	50	1 45 26.0	1 45 10.5	1 44 55.0	1 44 39.5	1 44 24.0	1 44 8.5	2.17	1.55
0		1 45 47.9	1 45 32.4	1 45 16.8	1 45 1.3	1 44 45.7	1 44 30.1	+2.19	-1.56

AZIMUTH OF POLARIS AT ELONGATION, 1918.

88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	88° 52' 40''	88° 52' 50''	Variation for—	
						1' of Lat.	1'' of δ.
° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	"	"
1 45 47.9	1 45 32.4	1 45 16.8	1 45 1.3	1 44 45.7	1 44 30.1	+2.19	-1.56
1 46 10.1	1 45 54.4	1 45 38.8	1 45 23.2	1 45 7.6	1 44 52.0	2.21	1.56
1 46 32.4	1 46 16.7	1 46 1.1	1 45 45.4	1 45 29.7	1 45 14.0	2.23	1.57
1 46 54.9	1 46 39.2	1 46 23.5	1 46 7.7	1 45 52.0	1 45 36.3	2.25	1.57
1 47 17.7	1 47 1.9	1 46 46.1	1 46 30.3	1 46 14.5	1 45 58.8	2.27	1.58
1 47 40.6	1 47 24.8	1 47 9.0	1 46 53.1	1 46 37.3	1 46 21.5	+2.29	-1.58
1 48 3.8	1 47 47.9	1 47 32.0	1 47 16.1	1 47 0.2	1 46 44.4	2.32	1.59
1 48 27.2	1 48 11.3	1 47 55.3	1 47 39.4	1 47 23.4	1 47 7.5	2.34	1.59
1 48 50.9	1 48 34.9	1 48 18.9	1 48 2.9	1 47 46.8	1 47 30.8	2.36	1.60
1 49 14.7	1 48 58.7	1 48 42.6	1 48 26.5	1 48 10.5	1 47 54.4	2.38	1.61
1 49 38.8	1 49 22.7	1 49 6.6	1 48 50.4	1 48 34.3	1 48 18.2	+2.41	-1.61
1 50 3.2	1 49 47.0	1 49 30.8	1 49 14.6	1 48 58.4	1 48 42.2	2.43	1.62
1 50 27.7	1 50 11.5	1 49 55.2	1 49 39.0	1 49 22.7	1 49 6.5	2.45	1.62
1 50 52.5	1 50 36.2	1 50 19.9	1 50 3.6	1 49 47.3	1 49 31.0	2.48	1.63
1 51 17.6	1 51 1.2	1 50 44.8	1 50 28.5	1 50 12.1	1 49 55.7	2.50	1.64
1 51 42.9	1 51 26.4	1 51 10.0	1 50 53.6	1 50 37.1	1 50 20.7	+2.53	-1.64
1 52 8.4	1 51 51.9	1 51 35.4	1 51 18.9	1 51 2.4	1 50 45.9	2.55	1.65
1 52 34.2	1 52 17.7	1 52 1.1	1 51 44.5	1 51 28.0	1 51 11.4	2.58	1.66
1 53 0.3	1 52 43.6	1 52 27.0	1 52 10.4	1 51 53.8	1 51 37.2	2.60	1.66
1 53 26.6	1 53 9.9	1 52 53.2	1 52 36.5	1 52 19.8	1 52 3.2	2.63	1.67
1 53 53.2	1 53 36.4	1 53 19.7	1 53 2.9	1 52 46.1	1 52 29.4	+2.66	-1.68
1 54 20.0	1 54 3.2	1 53 46.4	1 53 29.6	1 53 12.7	1 52 55.9	2.68	1.68
1 54 47.1	1 54 30.2	1 54 13.4	1 53 56.5	1 53 39.6	1 53 22.7	2.71	1.69
1 55 14.5	1 54 57.6	1 54 40.6	1 54 23.7	1 54 6.7	1 53 49.8	2.73	1.69
1 55 42.2	1 55 25.1	1 55 8.1	1 54 51.1	1 54 34.1	1 54 17.1	2.76	1.70
1 56 10.1	1 55 53.0	1 55 35.9	1 55 18.8	1 55 1.8	1 54 44.7	+2.79	-1.71
1 56 38.3	1 56 21.2	1 56 4.0	1 55 46.9	1 55 29.7	1 55 12.6	2.82	1.71
1 57 6.9	1 56 49.6	1 56 32.4	1 56 15.2	1 55 58.0	1 55 40.7	2.85	1.72
1 57 35.7	1 57 18.4	1 57 1.1	1 56 43.8	1 56 26.5	1 56 9.2	2.88	1.73
1 58 4.8	1 57 47.4	1 57 30.1	1 57 12.7	1 56 55.3	1 56 38.0	2.91	1.74
1 58 34.2	1 58 16.8	1 57 59.3	1 57 41.9	1 57 24.4	1 57 7.0	+2.94	-1.74
1 59 3.9	1 58 46.4	1 58 28.9	1 58 11.4	1 57 53.9	1 57 36.3	2.97	1.75
1 59 34.0	1 59 16.4	1 58 58.8	1 58 41.2	1 58 23.6	1 58 6.0	3.00	1.76
2 0 4.3	1 59 46.6	1 59 29.0	1 59 11.4	1 58 53.7	1 58 36.0	3.03	1.77
2 0 35.0	2 0 17.2	1 59 59.5	1 59 41.8	1 59 24.0	1 59 6.3	3.06	1.77
2 1 6.0	2 0 48.1	2 0 30.3	2 0 12.5	1 59 54.7	1 59 36.9	+3.09	-1.78
2 1 37.3	2 1 19.4	2 1 1.5	2 0 43.6	2 0 25.7	2 0 7.8	3.13	1.79
2 2 8.9	2 1 51.0	2 1 33.0	2 1 15.0	2 0 57.0	2 0 39.1	3.16	1.80
2 2 40.9	2 2 22.9	2 2 4.8	2 1 46.8	2 1 28.7	2 1 10.7	3.20	1.80
2 3 13.2	2 2 55.1	2 2 37.0	2 2 18.9	2 2 0.7	2 1 42.6	3.23	1.81
2 3 45.9	2 3 27.7	2 3 9.5	2 2 51.3	2 2 33.1	2 2 14.9	+3.26	-1.82
2 4 19.0	2 4 0.7	2 3 42.4	2 3 24.1	2 3 5.8	2 2 47.5	3.30	1.83
2 4 52.4	2 4 34.0	2 4 15.6	2 3 57.2	2 3 38.9	2 3 20.5	3.34	1.84
2 5 26.1	2 5 7.7	2 4 49.2	2 4 30.8	2 4 12.3	2 3 53.9	3.37	1.84
2 6 0.2	2 5 41.7	2 5 23.2	2 5 4.6	2 4 46.1	2 4 27.6	3.41	1.85
2 6 34.7	2 6 16.1	2 5 57.5	2 5 38.9	2 5 20.3	2 5 1.6	+3.45	-1.86
2 7 9.6	2 6 50.9	2 6 32.2	2 6 13.5	2 5 54.8	2 5 36.1	3.48	1.87
2 7 44.9	2 7 26.1	2 7 7.3	2 6 48.5	2 6 29.7	2 6 11.0	3.52	1.88
2 8 20.6	2 8 1.7	2 7 42.8	2 7 23.9	2 7 5.1	2 6 46.2	3.56	1.89
2 8 56.6	2 8 37.7	2 8 18.7	2 7 59.7	2 7 40.8	2 7 21.8	3.60	1.90
2 9 33.1	2 9 14.0	2 8 55.0	2 8 35.9	2 8 16.9	2 7 57.8	+3.65	-1.91
2 10 10.0	2 9 50.8	2 9 31.7	2 9 12.6	2 8 53.4	2 8 34.2	3.69	1.92
2 10 47.3	2 10 28.1	2 10 8.8	2 9 49.6	2 9 30.3	2 9 11.1	3.73	1.92
2 11 25.0	2 11 5.7	2 10 46.4	2 10 27.0	2 10 7.7	2 9 48.4	3.77	1.93
2 12 3.2	2 11 43.8	2 11 24.3	2 11 4.9	2 10 45.5	2 10 26.0	3.81	1.94
2 12 41.8	2 12 22.3	2 12 2.7	2 11 43.2	2 11 23.7	2 11 4.2	+3.86	-1.95
2 13 20.8	2 13 1.2	2 12 41.6	2 12 22.0	2 12 2.4	2 11 42.7	3.90	1.96
2 14 0.3	2 13 40.6	2 13 20.9	2 13 1.2	2 12 41.5	2 12 21.7	3.95	1.97
2 14 40.3	2 14 20.5	2 14 0.6	2 13 40.8	2 13 21.0	2 13 1.2	4.00	1.98
2 15 20.7	2 15 0.8	2 14 40.9	2 14 21.0	2 14 1.1	2 13 41.1	4.04	1.98
2 16 1.6	2 15 41.6	2 15 21.6	2 15 1.6	2 14 41.6	2 14 21.5	+4.09	-2.00

AZIMUTH OF POLARIS AT ELONGATION, 1918.

Decl. Lat.	88° 52' 0''			88° 52' 10''			88° 52' 20''			88° 52' 30''			88° 52' 40''			88° 52' 50''			Variation for—																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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OR REDUCING TO ELONGATION OBSERVATIONS MADE NEAR ELONGATION.

Azimuth at Elong. ime.									Azimuth at Elong. Time.*
	1° 0′	1° 10′	1° 20′	1° 30′	1° 40′	1° 50′	2° 0′	2° 10′	
m	"	"	"	"	"	"	"	"	m
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1	0.0	0.0	0.0	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	1
2	+ 0.1	+ 0.2	+ 0.2	0.2	0.2	0.3	0.3	0.3	2
3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	3
4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	4
5	+ 0.9	+ 1.0	+ 1.1	+ 1.3	+ 1.4	+ 1.6	+ 1.7	+ 1.9	5
6	1.2	1.4	1.6	1.8	2.1	2.3	2.5	2.7	6
7	1.7	2.0	2.2	2.5	2.8	3.1	3.4	3.7	7
8	2.2	2.6	2.9	3.3	3.7	4.0	4.4	4.8	8
9	2.8	3.2	3.7	4.2	4.6	5.1	5.6	6.0	9
10	+ 3.4	+ 4.0	+ 4.6	+ 5.1	+ 5.7	+ 6.3	+ 6.9	+ 7.4	10
11	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0	11
12	4.9	5.8	6.6	7.4	8.2	9.0	9.9	10.7	12
13	5.8	6.8	7.7	8.7	9.7	10.6	11.6	12.6	13
14	6.7	7.8	9.0	10.1	11.2	12.3	13.4	14.6	14
15	+ 7.7	+ 9.0	+10.3	+11.6	+12.8	+14.1	+15.4	+16.7	15
16	8.8	10.2	11.7	13.2	14.6	16.1	17.5	19.0	16
17	9.9	11.5	13.2	14.9	16.5	18.2	19.8	21.5	17
18	11.1	12.9	14.8	16.7	18.5	20.4	22.2	24.1	18
19	12.4	14.4	16.5	18.6	20.6	22.7	24.7	26.8	19
20	+13.7	+16.0	+18.3	+20.6	+22.8	+25.1	+27.4	+29.7	20
21	15.1	17.6	20.1	22.7	25.2	27.7	30.2	32.7	21
22	16.6	19.3	22.1	24.9	27.6	30.4	33.2	35.9	22
23	18.1	21.1	24.2	27.2	30.2	33.2	36.2	39.3	23
24	19.7	23.0	26.3	29.6	32.9	36.2	39.5	42.8	24
25	+21.4	+25.0	+28.5	+32.1	+35.7	+39.2	+42.8	+46.4	25

Azimuth at Elong. ime.									Azimuth at Elong. Time.*
	2° 10′	2° 20′	2° 30′	2° 40′	2° 50′	3° 0′	3° 10′	3° 20′	
m	"	"	"	"	"	"	"	"	m
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	1
2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	2
3	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	3
4	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.8	4
5	+ 1.9	+ 2.0	+ 2.1	+ 2.3	+ 2.4	+ 2.6	+ 2.7	+ 2.9	5
6	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	6
7	3.7	3.9	4.2	4.5	4.8	5.0	5.3	5.6	7
8	4.8	5.1	5.5	5.9	6.2	6.6	7.0	7.3	8
9	6.0	6.5	7.0	7.4	7.9	8.3	8.8	9.3	9
10	+ 7.4	+ 8.0	+ 8.6	+ 9.2	+ 9.7	+10.3	+10.9	+11.4	10
11	9.0	9.7	10.4	11.1	11.8	12.4	13.1	13.8	11
12	10.7	11.5	12.3	13.2	14.0	14.8	15.6	16.5	12
13	12.6	13.5	14.5	15.4	16.4	17.4	18.4	19.3	13
14	14.6	15.7	16.8	17.9	19.0	20.2	21.3	22.4	14
15	+16.7	+18.0	+19.3	+20.6	+21.9	+23.1	+24.4	+25.7	15
16	19.0	20.5	21.9	23.4	24.9	26.3	27.8	29.3	16
17	21.5	23.1	24.8	26.4	28.1	29.7	31.4	33.0	17
18	24.1	25.9	27.8	29.6	31.5	33.3	35.2	37.0	18
19	26.8	28.9	30.9	33.0	35.1	37.1	39.2	41.3	19
20	+29.7	+32.0	+34.3	+36.6	+38.8	+41.1	+43.4	+45.7	20
21	32.7	35.3	37.8	40.3	42.8	45.3	47.9	50.4	21
22	35.9	38.7	41.5	44.2	47.0	49.8	52.5	55.3	22
23	39.3	42.3	45.3	48.3	51.4	54.4	57.4	60.4	23
24	42.8	46.0	49.3	52.6	55.9	59.2	62.5	65.8	24
25	+46.4	+49.9	+53.5	+57.1	+60.7	+64.2	+67.8	+71.4	25

* Sidereal time from elongation.

FOR FINDING THE TIMES OF UPPER AND LOWER CULMINATION OF POLARIS, 1918, FROM THE OBSERVED TIMES WHEN THE STAR IS ON THE SAME VERTICAL CIRCLE WITH THE STARS ζ URSE MAJORIS (MIZAR) *SUB POLO* AND δ CASSIOPEIÆ *SUB POLO*, RESPECTIVELY.

Except at high latitudes, the pole star at either upper or lower culmination furnishes a simple and convenient method for laying down a meridian line on the earth's surface at points in the northern hemisphere. When the local time is unknown and accurate astronomical instruments are not available, the time of culmination of Polaris may be found by observing the instant when Polaris is vertically above (has the same azimuth as) ζ Ursæ Majoris (Mizar) below the pole, or δ Cassiopeiæ below the pole. In the former case, for the year 1918, Polaris is approaching upper culmination and in the latter case it is approaching lower culmination. The mean time interval which elapses between either of the observed times above mentioned and upper or lower culmination, as the case may be, is given at ten-day intervals in the following table. This method can not be used at places south of 30° north latitude.

ζ URSE MAJORIS (MIZAR). (Upper culmination of Polaris.)						δ CASSIOPEIÆ. (Lower culmination of Polaris.)					
Lat. Date.	40°	45°	50°	55°	60°	Lat. Date.	35°	40°	45°	50°	55°
Jan. 1	m s 10 2	m s 10 0	m s 9 58	m s 9 55	m s 9 51	Jan. 1	m s 11 10	m s 11 12	m s 11 14	m s 11 16	m s 11 19
11	9 52	9 50	9 47	9 45	9 41	11	10 59	11 1	11 3	11 6	11 9
21	9 40	9 39	9 37	9 34	9 31	21	10 49	10 50	10 52	10 55	10 58
Feb. 31	9 30	9 28	9 26	9 24	9 20	Feb. 31	10 38	10 40	10 42	10 44	10 47
10	9 20	9 18	9 16	9 14	9 10	10	10 28	10 29	10 31	10 34	10 37
20	9 11	9 9	9 7	9 5	9 1	20	10 18	10 20	10 22	10 24	10 27
Mar. 2	9 3	9 1	8 59	8 57	8 53	Mar. 2	10 10	10 12	10 14	10 16	10 19
June 30	9 46	9 44	9 42	9 39	9 36	12	10 4	10 6	10 8	10 10	10 13
July 10	9 57	9 56	9 53	9 50	9 47	22	10 0	10 1	10 3	10 5	10 8
20	10 9	10 7	10 4	10 1	9 58	Apr. 1	9 57	9 59	10 0	10 3	10 5
30	10 20	10 18	10 15	10 12	10 8	11	9 57	9 58	10 0	10 2	10 5
Aug. 9	10 30	10 28	10 26	10 23	10 19	21	9 58	10 0	10 2	10 4	10 7
19	10 40	10 38	10 35	10 32	10 28	May 1	10 2	10 4	10 5	10 8	10 10
29	10 49	10 47	10 44	10 41	10 37	11	10 7	10 9	10 11	10 13	10 16
Sept. 8	10 57	10 55	10 52	10 49	10 45	21	10 15	10 16	10 18	10 20	10 23
18	11 3	11 1	10 59	10 56	10 51	June 31	10 23	10 25	10 27	10 29	10 32
28	11 9	11 6	11 4	11 1	10 57	10	10 33	10 35	10 36	10 39	10 42
Oct. 8	11 12	11 10	11 8	11 4	11 0	20	10 43	10 45	10 47	10 49	10 52
18	11 14	11 12	11 10	11 7	11 2	July 30	10 54	10 56	10 58	11 1	11 4
28	11 15	11 13	11 10	11 7	11 3	10	11 6	11 8	11 10	11 12	11 15
Nov. 7	11 14	11 11	11 9	11 6	11 2	20	11 17	11 19	11 21	11 24	11 27
17	11 10	11 8	11 6	11 3	10 59	July 30	11 28	11 30	11 32	11 35	11 38
27	11 6	11 4	11 1	10 58	10 54	Nov. 27	12 16	12 18	12 20	12 23	12 26
Dec. 7	10 59	10 57	10 55	10 52	10 48	Dec. 7	12 9	12 11	12 13	12 16	12 19
17	10 51	10 49	10 47	10 44	10 40	17	12 1	12 3	12 5	12 8	12 11
27	10 42	10 40	10 38	10 35	10 31	27	11 52	11 53	11 56	11 58	12 1
31	10 38	10 36	10 34	10 31	10 27	31	11 47	11 49	11 52	11 54	11 57

ARENT PLACE, TIME OF UPPER CULMINATION, AND TIME INTERVAL BETWEEN UPPER CULMINATION AND ELONGATION EAST OR WEST, OF POLARIS, 1918.

The local mean time of culmination on any meridian for a given date is found by taking the following table the *Mean Time* of the nearest Greenwich culmination, and applying to a product of the *Var. per Day* by the integral number of intervening days, this product ; numerically additive for an earlier date and subtractive for a later date than that given e table; and by applying also the product of the *Var. per Hour* by the longitude from wwich expressed in hours and fractions of an hour, this product being numerically additive ast longitudes and subtractive for West longitudes.

The time interval between upper and lower culmination is 12^h diminished by one-half the erical value of the *Var. per Day*.

The last column below applies to all meridians.

ate.	Upper Culmination, Meridian of Greenwich.					Lat- tude.	Mean Time Interval, Elongation minus Upper Culm.
	Apparent Right Ascension.	Apparent Declination.	Mean Time.	Var. per Day.	Var. per Hour.		
	h m 1 29 s	° ' " +88 51	h m s	m s	W. E. s	°	W. E. h m
a. 1	129	88.3	6 48 44	-3 56.9	-9.87+	10	+5 58.2-
11	119	89.3	6 9 14	3 57.0	9.87	12	5 58.1
21	108	89.6	5 29 44	3 57.0	9.87	14	5 57.9
31	97	89.3	4 50 15	3 57.0	9.87	16	5 57.7
b. 10	87	88.3	4 10 45	3 56.9	9.87	18	5 57.6
20	78	86.7	3 31 17	-3 56.8	-9.87+	20	+5 57.4-
r. 2	70	84.6	2 51 50	3 56.6	9.86	22	5 57.2
12	64	82.1	2 2 25	3 56.5	9.85	24	5 57.0
22	59	79.2	1 33 1	3 56.3	9.84	26	5 56.8
r. 1	57	76.2	0 53 40	3 56.1	9.84	28	5 56.6
11	56	73.0	0 14 20	-3 55.8	-9.83+	30	+5 56.4-
20	58	70.0	23 35 3	3 55.6	9.82	32	5 56.2
30	61	67.0	22 55 47	3 55.5	9.81	34	5 56.0
y 10	67	64.3	22 16 33	3 55.3	9.80	36	5 55.7
20	74	61.9	21 37 21	3 55.1	9.80	38	5 55.5
30	83	60.0	20 58 11	-3 55.0	-9.79+	40	+5 55.2-
ne 9	92	58.6	20 19 1	3 54.9	9.79	42	5 55.0
19	103	57.6	19 39 53	3 54.8	9.78	44	5 54.7
29	114	57.2	19 0 45	3 54.8	9.78	46	5 54.4
ly 9	125	57.4	18 21 37	3 54.8	9.78	48	5 54.0
19	137	58.1	17 42 29	-3 54.8	-9.78+	50	+5 53.7-
29	148	59.3	17 3 21	3 54.8	9.78	52	5 53.3
g. 8	159	61.0	16 24 13	3 54.9	9.79	54	5 52.8
18	169	63.1	15 45 4	3 54.9	9.79	56	5 52.3
28	178	65.7	15 5 54	3 55.0	9.79	58	5 51.8
pt. 7	186	68.7	14 26 43	-3 55.2	-9.80+	60	+5 51.2-
17	193	71.9	13 47 31	3 55.3	9.80	62	5 50.6
27	199	75.4	13 8 17	3 55.4	9.81	64	5 49.8
t. 7	203	79.1	12 29 2	3 55.6	9.82	66	5 48.9
17	205	82.8	11 49 46	3 55.8	9.82	68	5 47.9
27	206	86.6	11 10 27	-3 55.9	-9.83+	70	+5 46.7-
iv. 6	205	90.3	10 31 7	3 56.1	9.84		
16	202	93.8	9 51 45	3 56.3	9.85		
26	197	97.1	9 12 21	3 56.4	9.85		
xc. 6	191	100.0	8 32 56	3 56.6	9.86		
16	183	102.5	7 53 29	-3 56.7	-9.86+		
26	174	104.4	7 14 1	-3 56.9	-9.87+		

ON THE ARRANGEMENT AND USE OF THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC.

There are in general use three different kinds of time, True Solar Time—so called Apparent Solar Time—Mean Solar Time, and Sidereal Time.

True or Apparent Solar Time is measured by the diurnal motion of the sun, the length of the day being the interval between two successive transits of the Sun over the same meridian, and the time of day being the hour-angle of the Sun westward from the meridian. Owing to the obliquity of the ecliptic and to the lack of uniformity of the motion of the Earth in its orbit, the rate of motion of the Sun in hour-angle and the length of the apparent solar day are not constant. Therefore clocks and chronometers can not be regulated to apparent solar time, which may, however, be determined by observations of the Sun when visible.

Mean Solar Time is measured by the motion of a fictitious body called the mean Sun, which is supposed to move uniformly in the celestial equator, completing the circuit in one tropical year. Since mean solar time is uniform and regular in its passage, clocks and watches may be regulated to it, and those in ordinary use are usually so regulated.

Mean solar time can not, of course, be determined by direct observation, but it may be determined indirectly by correcting observations of the Sun for the equation of time, or by converting to mean time sidereal time determined by observations of fixed stars.

The Equation of Time is the difference in hour-angle between the true Sun and the mean Sun. The true Sun is sometimes before and sometimes behind the mean Sun by an amount which varies from zero to about 16 minutes. The equation of time is given for Greenwich mean noon on pages 2–16 and for Washington apparent noon on pages 514–521.

The Mean Solar Day is the unit of mean solar time and is equal in length to the mean or average of all the true or apparent solar days of the year. It may be otherwise defined as the interval of time elapsing between two successive transits of the mean Sun across the meridian of any place.

Sidereal Time or star time, in general terms, is measured by the diurnal motion of the fixed stars, or, speaking more precisely, by the diurnal motion of that point on the celestial equator called the vernal equinox, from which the right ascensions of the heavenly bodies are measured. Astronomical clocks regulated to sidereal time are called sidereal clocks. Sidereal time may be determined from observations of stars whose right ascensions are known.

A Sidereal Day is very nearly the length of time in which the Earth rotates on its axis and is accurately defined as the time interval between two suc-

cessive transits of the vernal equinox over the same meridian. The sidereal day is shorter than the mean solar day by $3^m 56^s.555$ sidereal time or $3^m 55^s.909$ mean solar time, the tropical year of 365.2422 mean solar days containing 366.2422 sidereal days. Sidereal time and the length of the sidereal day are subject to slight irregularities on account of small differences between the positions of the true and mean equinoxes.

The mean solar and sidereal days are each divided into 24 hours. About March 23 (civil date) of each year, about two days after the vernal equinox, there is an instant when the face of a sidereal clock shows the same time as a mean time clock, and the former gains on the latter $3^m 56^s.555$ sidereal time per mean solar day, so that at the end of a year it will have gained one sidereal day and will again agree with the mean time clock.

The Civil Day begins at midnight and comprises 24 hours, the hours being counted from 0 to 12 in two series; the first, marked A. M., running from midnight to noon, and the second, marked P. M., running from noon to midnight.

The Astronomical Day begins at noon on the civil day of the same date, the 24 hours being counted from 0 to 24, running from noon of one day to noon of the next following day. Astronomical time as well as civil time may be either apparent or mean.

The civil day begins twelve hours before the astronomical day; therefore the first half of the civil day coincides with the last half of the preceding astronomical day, and the last half of the civil day coincides with the first half of the astronomical day of the same date. Hence we have the following rules:

To convert Civil Time into Astronomical Time.—If the civil time is marked A. M., take one from the day and add twelve to the hours; if the civil time is marked P. M., take away the designation P. M. Thus, January 9, 2 o'clock, A. M., civil time, is January 8, 14^h , astronomical time; and January 9, 2 o'clock, P. M., civil time, is January 9, 2^h , astronomical time.

To convert Astronomical Time into Civil Time.—If the astronomical time is less than twelve hours, write P. M. after it; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To convert Solar or Sidereal Time of any meridian B to that of another meridian A, add the difference of longitude expressed in time when A is east of B, and subtract the difference of longitude when A is west of B.

Greenwich mean time, which at any fixed observatory is obtained by applying the longitude to the local mean time, on board ship is usually taken from the mean time chronometer set to Greenwich time.

Greenwich mean noon of any date means the noon at the beginning of the astronomical day.

PART I.—THE EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

Pages 2–17 contain for Greenwich mean noon of each day the *Sun's Apparent Right Ascension, Apparent Declination, Semidiameter, Horizontal Parallax, True Longitude, and Latitude*. They also contain the *Logarithm of the Radius Vector of the Earth, the Precession in Longitude, the Nutation in Longitude, the Aberration, the True Obliquity, the Equation of Time, the Sidereal Time or Right Ascension of Mean Sun, and the Mean Time of Sidereal Noon*. Adjoining columns contain, for each Greenwich mean noon, the *Variation per*

Hour for those of the quantities for which it seemed advisable to give a rate of motion. By multiplying any one of those variations by the hours and parts of an hour from Greenwich mean noon and adding the product algebraically to the corresponding quantity at noon, we obtain an approximate value of the quantity in question for any given Greenwich mean time. If great exactness is desired, the value of the hourly variation is found for the time halfway between Greenwich mean noon and the given Greenwich mean time before multiplying by the hours and parts of an hour from Greenwich mean noon.

It is to be noted that here, as elsewhere throughout the volume, the positive sign used with declinations or latitudes indicates north and the negative sign south.

The Sun's *Apparent Right Ascension* and *Declination* are affected both by aberration and by nutation, and therefore denote the *apparent* position of the *true* Sun. The Sun's *True Longitude* is the true geometric longitude not corrected for aberration; it is referred to the true equinox.

The Sun's *Latitude* is referred to the ecliptic of the date.

The Sun's *Declination* is required whenever that body is observed for the purpose of finding latitude, local time, or azimuth.

The Sun's *Semidiameter* is used in reducing the altitude of the upper or lower limb of the Sun to the altitude of the center; and in reducing the angular distance between the limb of the Sun and any other object to the distance from the center of the Sun.

The *Horizontal Parallax* is the angle subtended by the equatorial radius of the Earth, as seen from the center of the Sun.

The *Precession in Longitude* is the quantity to be applied to the longitude of the Sun referred to the mean equinox of the beginning of the Besselian fictitious year, i. e., the instant when the Sun's mean longitude is 280° , in order to refer it to the mean equinox of date.

The *Nutation in Longitude* is the quantity to be applied to the longitude of a body referred to the mean equinox of date in order to refer it to the true equinox, short-period terms being neglected.

The *Aberration* is the quantity to be subtracted from the true longitude of the Sun in order to obtain its apparent longitude.

The *True Obliquity* is the inclination of the Earth's equator to the ecliptic, short-period terms being neglected.

The corrections to the values of the nutation and the obliquity here given, to take account of the short-period terms, may be found on pages 215–216.

The *Equation of Time* is the apparent time of Greenwich mean noon, or the hour angle of the true Sun at that instant. When interpolated to any given Greenwich mean time, it is the correction to be applied to mean time in order to obtain apparent time.

The *Sidereal Time of Mean Noon* is the right ascension of the mean Sun at Greenwich mean noon. It may be reduced for the longitude or to any Greenwich mean time by using the hourly variation, $+9^s.8565$; or by Table III, page 695 of this volume, for reducing intervals of mean time to sidereal time. It is useful in converting mean time to sidereal time. We first find the Greenwich mean time, then the right ascension of the mean Sun for that time,

and this being added to the local astronomical mean time, i. e., the hour angle of the mean Sun, will give the hour angle of the vernal equinox, or the sidereal time required.

The sidereal time of mean noon, reduced for the longitude of the place, is also used in converting sidereal time to mean time. Subtracting the reduced value from the given sidereal time gives the interval of sidereal time past noon, and that is converted into the required mean time by subtracting from it the corresponding reduction of a sidereal interval to a mean-time interval, taken from Table II, page 692 of this volume. If the sidereal interval is less than $3^{\text{m}} 56^{\text{s}}.555$, there are two mean times corresponding to the given sidereal time, one a few minutes after the preceding noon, and the other a few minutes before the following noon, the mean time interval between these two mean times being $23^{\text{h}} 56^{\text{m}} 4^{\text{s}}.09$. The mean time, approximately known, will always show which one is to be taken. Instead of using Table II the reduction of a sidereal to a mean time interval may be found by multiplying $-9^{\text{s}}.8296$ by the hours and parts of an hour of the sidereal interval.

The *Mean Time of Sidereal Noon* is the number of hours, minutes, and seconds after Greenwich mean noon when the vernal equinox passes the meridian of Greenwich; it may be reduced to any other meridian by using the hourly variation, $-9^{\text{s}}.8296$, to effect the necessary interpolation, or the reduction may be taken directly from Table II. In the same way the reduction may be made to any Greenwich sidereal time, and the result will then represent 24^{h} —Right Ascension of the Mean Sun. This column may be conveniently used for converting sidereal to mean time, or—which is the same problem—for finding the time of meridian passage of a star whose right ascension is known, by adding to the mean time of the *preceding* local sidereal noon, the mean time equivalent of the given sidereal time.

As examples of the use of pages 2–17:

1. Let the Sun’s declination be required for 1918, April 14, $2^{\text{h}} 5^{\text{m}} 20^{\text{s}}$, P. M., at a place whose longitude is $58^{\circ} 20'$, or $3^{\text{h}} 53^{\text{m}} 20^{\text{s}}$ west from Greenwich:

Local mean time	April 14,	<div><div>h</div><div>m</div><div>s</div></div> <div>2 5 20</div>
Longitude from Greenwich (additive) . . . . .	. . . . .	<div><div>3 53 20</div></div>
Greenwich mean time	April 14,	<div><div>5 58 40</div></div>

Reducing the minutes and seconds to decimals of an hour, we find that this moment is $5^{\text{h}}.978$ after Greenwich mean noon on April 14, or $18^{\text{h}}.022$ before Greenwich mean noon on April 15.

On page 6 of the Ephemeris we find that the variation of declination per hour is:

At Greenwich mean noon, April 14	<div><div>"</div><div>+54.21</div></div>
At Greenwich mean noon, April 15	<div><div>+53.82</div></div>
Difference for one day	<div><div>- 0.39</div></div>

If great exactness is desired, we find the amount of this hourly variation for the time halfway between Greenwich noon and the time of observation; that is, for 3 hours after Greenwich noon of the 14th, this being half of 6 hours. *Three hours* is 0.125 of a day; so the calculation is as follows:

With equal facility the computation might have been made backward from the succeeding noon. Thus in the example just given the time is $18^h.022$ before Greenwich noon of April 15; half this interval is about 0.375 of a day, and the hourly motion for the middle of the interval is $+53''.97$. Then we find:

It will always be well to make the calculation in both ways, as a check; and if the results differ slightly the one derived from the nearest noon should be regarded as the more accurate.

Local astronomical mean time	July 12,	^h 22	^m 3	^s 30
Longitude from Greenwich (additive)			5	41 0
Greenwich mean time	July 13,	^h 3	44	30-3.7417

In this case the hourly variations interpolated to half the interval, or .87 after noon, have been used.

	^h	^m	^s
Sidereal time at Greenwich mean noon, July 13	7	22	13.61
Reduction for 3 ^h 44 ^m 30 ^s from Table III, or 9 ^s .8565×3.7417			+ 36.88
Add the local astronomical mean time	22	3	30.00
The required sidereal time (rejecting 24 ^h)	5	26	20.49

4. On 1918, July 13, A. M., at a place whose longitude is $85^{\circ} 15' W.$, suppose the sidereal time to be $5^h 26^m 20^s.49$ and that the corresponding mean time is required.

The astronomical day is July 12; the longitude in time, $+5^h\ 41^m\ 0^s$, or $+5^h.6833$.

First solution.

Sidereal time at Greenwich mean noon, July 12	<div>h m s</div> <div>7 18 17.06</div>
Reduction for $5^h\ 41^m\ 0^s$ from Table III, or $9^s.8565\times5.6833$	<div>+56.02</div>
The sidereal time at local mean noon, July 12	<div>7 19 13.08</div>
The given sidereal time ($+24^h$, if necessary for the following subtraction)	<div>29 26 20.49</div>
Subtracting the first from the second gives the sidereal interval from noon	<div>22 7 7.41</div> <div>$-22^h.1187$</div>
Reduction for $22^h\ 7^m\ 7^s.41$ from Table II, or $-9^s.8296\times22.1187$	<div>-3 37.42</div>
The required astronomical mean time July 12,	<div>22 3 29.99</div>

Second solution.

Mean time at Greenwich sidereal noon July 12,	<div>h m s</div> <div>16 38 58.84</div>
Reduction for longitude from Table II, or $-9^s.8296\times5.6833$	<div>-55.86</div>
Mean time of <i>preceding</i> local sidereal noon July 12,	<div>16 38 2.98</div>
Add the given sidereal time	<div>5 26 20.49</div>
Reduction for $5^h\ 26^m\ 20^s.49$ from Table II, or $-9^s.8296\times5.4390$	<div>-53.46</div>
The required astronomical mean time July 12,	<div>22 3 30.01</div>

If there is any doubt about the mean time of the *preceding* local sidereal noon, the first solution is to be preferred.

Pages 18–25 contain the rectangular coordinates of the Sun, referred to the center of the Earth as the origin, and to the true equator and equinox as the plane and point of reference. Each coordinate is given for every Greenwich mean noon and midnight. The columns *Reduc. to Mean Eq'x of 1918.0* give the corrections to be applied to the coordinates for noon in order to obtain the corresponding coordinates referred to the mean equator and equinox of the beginning of the Besselian fictitious year.

Pages 26–117 contain *The Moon's Right Ascension and Declination* for each day and hour of Greenwich mean time, referred to the true equator and equinox. They are accompanied by columns of *Variations per Minute*, by means of which, interpolation may be conveniently made to any moment of Greenwich mean time. The right ascension or declination is taken out for the given day and hour of Greenwich mean time; the *Var. per Min.* is multiplied by the minutes and parts of a minute of the Greenwich time, and the product is added numerically in case of the right ascension and algebraically in case of the declination.

Thus, suppose the Moon's right ascension and declination are required for 1918, January 25, $10^h\ 10^m\ 30^s$, astronomical mean time at Greenwich:

	Right Ascension.	Declination.
	<div>h m s</div>	<div>° ' "</div>
January 25, 10^h	<div>7 31 8.18</div>	<div>+19 59 21.0</div>
Change in 10.5 minutes $2^s.1492\times10.5$	<div>22.57</div> <div>$-7''.421\times10.5$</div>	<div>- 1 17.9</div>
January 25, $10^h\ 10^m\ 30^s$	<div>7 31 30.75</div>	<div>+19 58 3.1</div>

For the sake of precision the differences here employed have been interpolated for $5^m.2=0^h.09$.

Page 117 contains also the Phases of the Moon and the dates of the *Moon's Apogee and Perigee*, or greatest and least distances from the Earth.

Pages 118–133 contain for every Greenwich mean noon and midnight the *Moon's Longitude* and *Latitude* referred to the true equinox and the ecliptic, its *Semidiameter*, and its *Equatorial Horizontal Parallax*. The column adjoining that of the horizontal parallax gives the variation of that quantity per hour, by means of which it can be reduced to any other Greenwich mean time in the manner shown in the preceding examples. When allowing for change in the variation itself, note must be taken of the fact that the tabular interval is here 12 hours instead of 24. The quantity thus obtained is the equatorial horizontal parallax; to obtain the horizontal parallax at any given place, the correction for the latitude of the place must be applied. The reduction of the Moon's semidiameter may be readily found by multiplying the reduction of the horizontal parallax by 0.2725 (see page xi), or by simply computing the proportional part.

If, for example, the semidiameter of the Moon is to be taken out for 1918, March 10, 7^h, P. M., Greenwich mean time, we see that the difference of the semidiameters at noon and midnight of March 10 is 5''.6; then,

$$12^h: 7^h - 5''.6 : 3''.3$$

which is the correction to be added to the semidiameter at noon, because the semidiameter is increasing. The Moon's semidiameter for March 10, 7^h, is therefore 16' 33''.7.

The Moon's semidiameter and horizontal parallax are required for all observations of the Moon.

Pages 118–133 contain also: The *Moon's Age*, or the time elapsed since the preceding new Moon, given to tenths of a day; the mean time of the *Moon's Transit, Upper and Lower*, at Greenwich, given to tenths of a minute; and the *Variation per Hour* of the latter quantity, that is, the variation for one hour of longitude, by means of which the local time of an upper or lower transit of the Moon may be computed for any place whose longitude is known.

Pages 134–198 contain for each of the seven major planets the geocentric ephemeris followed immediately by the heliocentric ephemeris.

The geocentric ephemeris gives the planet's *Apparent Right Ascension* and *Apparent Declination* with the respective *Variations per Hour* or *per Day*. The positions thus given are referred to the true equator and equinox, and are corrected for aberration. The geocentric ephemeris gives also the *Logarithm of Distance from Earth* with the *Variation per Hour* or *per Day*, the planet's *Semidiameter* and *Horizontal Parallax*, and, to tenths of a minute, the time of *Transit Meridian of Greenwich*. All the data, except the last named, are given for Greenwich mean noon.

The right ascension and declination of a planet are required whenever it is observed for time, latitude, or azimuth. The mode of reducing the ephemeris positions of planets to other instants of Greenwich mean time is the same as that already given for the Sun. The local mean time of meridian transit of any planet at any place can be found by dividing the proper daily difference of the ephemeris times by 24, multiplying the quotient by the longitude of the place expressed in hours and fractions, and applying the product with its proper sign to the time of Greenwich transit.

The heliocentric ephemeris gives the *Heliocentric Longitude*, *Mean Equinox of Date*; the *Heliocentric Latitude*; and the *Logarithm of Radius Vector*; with

their respective *Variations per Day*. The heliocentric longitude may be referred to the true equinox by applying nutation. The variations are given for the instant of Greenwich mean noon. The column *Reduction to Orbit* contains the correction to be applied to the heliocentric longitude in order to obtain the longitude measured along the orbit of the planet. This orbit longitude is equal to the distance from the mean equinox to the node, plus the distance from the node to the planet. The heliocentric latitude is referred to the ecliptic of the date. The *Logarithm of Radius Vector* is the logarithm of the distance of the center of the planet from that of the Sun.

PART II.—THE EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

Pages 200–201 contain formulæ for reducing mean positions of stars to apparent positions, including expressions for the Besselian star-numbers and star-constants, and for the independent star-numbers; the whole based upon the constants of the Paris Conference of May, 1896, and expressed in the notation of BESSEL.

Pages 202–205 contain the logarithms of the *Besselian Star-Numbers*, A , B , C , D , for each Washington mean midnight, with the values of E appended at the bottoms of the pages. The terms of short period have been included. These numbers serve to reduce the mean place of a star at the beginning of the Besselian fictitious year to its apparent place at any of the dates for which the numbers are given, and in ordinary cases four-figure logarithms suffice; but where extreme accuracy is desired the logarithms of A , C , and D are sometimes needed to five places of decimals. Along with the solar day, the first column contains the sidereal hour of Washington mean midnight for certain dates, and by interpolation among them it is easy to find the sidereal time for which any set of quantities is given.

The following is an example of the reduction of a star to apparent place by the Besselian star-numbers:

Computation of the apparent place of α Aquilæ, May 26, 1918, for the upper transit at Washington.

$\log a$	0.5165	$\log b$	7.2455 n	$\log c$	8.0449	$\log d$	8.8235 n
$\log A$	9.8584	$\log B$	0.1516	$\log C$	0.8964 n	$\log D$	1.2691 n
$\log a'$	0.5174	$\log b'$	9.9941	$\log c'$	9.4341	$\log d'$	8.4160 n
$\log Aa$	0.3749	$\log Bb$	7.3971 n	$\log Cc$	8.9413 n	$\log Dd$	0.0926
$\log Aa'$	0.3758	$\log Bb'$	0.1457	$\log Cc'$	0.3305 n	$\log Dd'$	9.6851
Mean Place, 1918.0				α_0 —	^h 18 ^m 37 ^s 47.104	δ_0 —	[°] —9 ['] 7 ["] 55.37
				Aa —	+2.371	Aa' —	+2.38
				Bb —	—0.002	Bb' —	+1.40
				Cc —	—0.087	Cc' —	—2.14
				Dd —	+1.238	Dd' —	+0.48
				E —	+0.003	$\tau\mu'$ —	0.00
				$\tau\mu$ —	+0.001		
Apparent Place, May 26,				α —	^h 18 ^m 37 ^s 50.628	δ —	[°] —9 ['] 7 ["] 53.25

Pages 206–213 contain the *Independent Star-Numbers*, which can frequently be advantageously used instead of the *Besselian Star-Numbers*. The terms of *short period* have been included. These quantities are connected with those of Bessel by the relations given on page 200, which also contains the formulæ

and precepts for the application of both systems of numbers. In order to use the Besselian numbers, it is necessary to have the values of the star-constants, $a, b, c, d, a', b', c', d'$, while the independent star-numbers render it possible to determine the apparent place of a star without computing these star-constants. Four-figure logarithms usually suffice, but where extreme accuracy is desired the logarithms of g and h are needed to five places of decimals, and G and H are needed to one-tenth of a minute of arc. The column τ gives the fraction of a year, counted from the beginning of the Besselian fictitious year to each date.

The following is an example of the reduction of a star to apparent place by the independent star-numbers:

Computation of the apparent place of ϵ Aquilæ, May 26, 1918, for the upper transit at Washington.

	$\begin{matrix} \text{h} & \text{m} \\ G = & 0 & 22.4 \end{matrix}$		$\delta_0 = - \begin{matrix} \circ & ' \\ 9 & 7.9 \end{matrix}$
	$\alpha_0 = 18 \ 37.8$		$G + \alpha_0 = 19^{\text{h}} \ 0^{\text{m}}.2$
	$H = 13 \ 31.9$		$H + \alpha_0 = 8 \ 9.7$
$\log \frac{1}{r}$	8.8239	$\log \frac{1}{r}$	8.8239
$\log g$	1.1624	$\log h$	1.3050
$\log \sin (G + \alpha_0)$	9.9848 n	$\log \sin (H + \alpha_0)$	9.9264
$\log \tan \delta_0$	9.2061 n	$\log \sec \delta_0$	0.0055
$\log (g)$	9.1772	$\log (h)$	0.0608
			$\alpha_0 = 18 \ 37 \ 47.104$
			$f + f' = +2.221$
			$(g) = +0.150$
			$(h) = +1.150$
			$\tau\mu = +0.001$
			$\alpha = 18 \ 37 \ 50.626$
$\log g$	1.1624	$\log h$	1.3050
$\log \cos (G + \alpha_0)$	9.4144	$\log \cos (H + \alpha_0)$	9.7293 n
$\log (g')$	0.5768	$\log \sin \delta_0$	9.2006 n
		$\log (h')$	0.2349
$\log i$	0.5337 n		$\delta_0 = - \begin{matrix} \circ & ' & '' \\ 9 & 7 & 55.37 \end{matrix}$
$\log \cos \delta_0$	9.9945		$(g') = +3.77$
$\log (i)$	0.5282 n		$(h') = +1.72$
			$(i) = -3.37$
			$\tau\mu' = 0.00$
			$\delta = - \begin{matrix} \circ & ' & '' \\ 9 & 7 & 53.25 \end{matrix}$

Page 214 contains for every tenth sidereal day the *Besselian* and *Independent Star-Numbers*, exclusive of all short-period terms. They are useful in computing ephemerides of stars, similar to those on pages 316–513, for which data containing short-period terms should not be employed.

Pages 215–216 contain for Washington mean midnight of each day the short-period terms of the nutation in longitude and obliquity, for use in connection with the formulæ on page 201, and the coefficients mentioned later, which are given for each star on pages 316–513.

Pages 217–230 contain the *Mean Places of Ten-day Stars* for the beginning of the Besselian fictitious year. These pages give also the magnitude, spectral type, annual variations, and proper motions for each star. The annual variations are to be considered as the differential coefficients of each coordinate with respect to the time at the beginning of the year.

Page 231 contains, for the *Circumpolar Stars*, the same data as the immediately preceding pages do for the ten-day stars.

Pages 232–315 contain for every upper transit at Washington the apparent positions of seventeen northern and eighteen southern circumpolar stars arranged in the order of their right ascensions. The mean solar time of transit is given in the column *Washington Mean Time*, in order that each transit above

and below the pole may be readily identified. Suppose, for example, that the transit of Polaris below the pole on January 26 is to be found, and we wish to know whether it precedes or follows the upper transit of the same date. On page 232 we find that the upper transit occurs January 26.2; the lower transit, therefore, occurs January 26.7. But the lower transit of July 1 precedes the upper one, which occurs July 1.8. A transit occurring very nearly at noon may also be identified without a computation to ascertain the actual mean date, by simply noting the tenth of a day in the column *Washington Mean Time*.

The secant and tangent of the apparent declination for the 15th of each month and the mean place in right ascension and declination for the beginning of the year are given for each star at the foot of the page.

Pages 316–513 contain, for every tenth upper transit at Washington, the apparent places of 790 stars, being all those given in the list of mean places of ten-day stars. The *Washington Mean Time* in the left-hand column of each page gives the day and tenth of the transit, so that intermediate transits may be readily identified; and to facilitate interpolation, the differences of each coordinate are given for every ten days.

In connection with the ephemeris of each ten-day star there are given at the foot of the page, (1) the seconds of the mean place in both right ascension and declination for the beginning of the year, (2) the secant and the tangent of the mean of the star's greatest and least apparent declinations during the year, and (3) the coefficients of the short-period terms of the nutation, the use of which is explained on page 201.

Pages 514–521 contain, for Washington apparent noon, the *Apparent Right Ascension* and *Declination* of the Sun, the *Equation of Time*, and the *Variation per Hour* of these quantities; the *Semidiameter* of the Sun, and the *Sidereal Time of Semidiameter Passing Meridian*. The last column on each page contains the *Sidereal Time of Mean Noon*.

The *Equation of Time, Mean–App.* is the correction to be applied to apparent time in order to obtain mean time. Each number as given is the mean time of transit of the Sun's center over the meridian of Washington counted from the nearest noon.

Pages 522–537 contain the *Right Ascension of Center*, the *Geocentric Declination of Center*, the *Sidereal Time of Semidiameter Passing Meridian*, the *Geocentric Semidiameter*, and the *Equatorial Horizontal Parallax* of the Moon, and the *Washington Mean Time* at the moment of each upper and lower transit over the meridian of Washington.

The *Variation per Hour of Longitude* is the correction to be applied in each case to the quantity in the preceding column to obtain its value for the time of transit over the meridian one hour west of Washington, supposing the rate of change to be uniform and equal to what it is at the instant of transit over the meridian of Washington. The quantities in the third column, when corrected for another longitude by the hourly variations, give the local mean time of transit for that longitude. By means of the variations per hour of longitude any one of the quantities under consideration can be computed with great *exactness* for the moment of transit over any meridian not more than one hour

stant from Washington. To obtain the same accuracy for more distant meridians, we may proceed as follows: Let F represent either the *Washington Mean Time*, the *Right Ascension of Center*, or the *Geocentric Declination of center*, and let V represent the corresponding *Variation per Hour of Longitude*. Write down three successive values of F , together with the corresponding values of V , and difference the latter as in the following scheme, where the middle values, F_0 and V_0 , belong to the culmination from which is to be derived the value of F for the culmination on the meridian whose longitude is λ :—

Function.	Var. per Hour of Longitude.	Δ'	Δ''
F_{-1}	V_{-1}	α'	b
F_0	V_0	α''	
F_{+1}	V_{+1}		

Then, for the culmination at the meridian λ

$$F_\lambda = F_0 + \lambda V_0 + \frac{\lambda^2}{48}(\alpha' + \alpha'') + \frac{\lambda^3 b}{864}$$

here λ must be expressed in hours and decimals of an hour, and reckoned from Washington or from 180° from Washington according as the upper or lower culmination is used for the middle value (F_0). Adding twelve hours to the Washington time of lower transit at Washington gives the local time of upper transit at places whose longitude is 180° from Washington.

The column *Bright Limbs* is given to indicate to the observer which limbs are illuminated. When one limb is full and the terminator is within $1''$ of the opposite limb, both can be well observed, and in such cases both are indicated, the defective limb being indicated by an italic letter or numeral, and the correction for defective illumination (as seen from Washington) being given in footnote.

Pages 538–555 contain for each of the seven major planets, the geocentric *apparent Right Ascension* and *Declination*, the *Horizontal Parallax*, *Semidiameter*, *Sidereal Time of Semidiameter Passing Meridian*, and the *Washington Mean Time*, for the moments of all transits which it is usually desirable to observe over the meridian of Washington. The stellar magnitude at opposition for Mars, Jupiter, Saturn, Uranus, and Neptune, respectively, is given at the bottom of the page containing the ephemeris of the planet.

PART III.—PHENOMENA.

This part gives the dates of the principal astronomical phenomena of the year, expressed in Greenwich mean time, except in the case of the occultations visible at Washington, where Washington time is used.

Pages 558–565 contain all necessary data respecting the solar and lunar eclipses which occur during the year.

The eclipse elements are given for the moment of conjunction of the Sun and Moon in right ascension, but the subsequent tables and results are computed from the exact positions of these bodies at the several instants referred to. The times and angles designated as the circumstances of a lunar eclipse remain the same throughout all parts of the Earth, and require no explanation.

beyond a mere statement of the fact that in computing them the geometrical diameter of the Earth's shadow has been augmented in the proportion of 51 : 50. The principal circumstances of each total and annular eclipse of the Sun are stated in five lines, as follows:—

The line entitled "Eclipse begins" gives the Greenwich mean time at which the Moon's penumbra first touches the Earth, together with the latitude and longitude of the point of contact.

The line entitled "Central eclipse begins" gives the time when the axis of the Moon's shadow first touches the Earth, together with the latitude and longitude of the point of contact.

The line entitled "Central eclipse at local apparent noon" gives the time when the axes of the Earth and of the shadow cone lie in the same plane, together with the latitude and longitude of the point where the axis of the shadow cone then cuts the Earth's surface.

The lines entitled "Central eclipse ends" and "Eclipse ends" give, respectively, the times when and the localities where these events occur, the phenomena being the converse of those denoted by the similar phrases for the beginning.

In the case of partial solar eclipses the axis of the Moon's shadow does not come into contact with the Earth, and the three lines entitled, respectively, "Central eclipse begins," "Central eclipse at local apparent noon," and "Central eclipse ends," are replaced by a single line entitled "Greatest eclipse," whereon are given the time when and the latitude and longitude where the eclipse attains its greatest magnitude. The latter phenomenon necessarily occurs with the Sun in the horizon.

Maps of the Eclipses.—The regions in which each eclipse is visible are shown upon the map relating to it, from which may be taken approximately, for any place, both the times of the beginning and ending of the eclipse and its magnitude. The dotted curves show the outline of the shadow for each hour of Greenwich mean time, and therefore pass through all places where the eclipse begins or ends at the hour indicated. To find the instant of beginning at any place, we determine by inspection between what pair of these curved lines the place is situated. The eclipse will then begin between the corresponding hours of Greenwich mean time; and the fraction of the hour may be determined by dividing the hour in the same proportion as the space representing it on the map is divided by the place in question. This division may be made a little more exact by allowing for changes in the spaces as indicated by their varying width. The Greenwich mean time thus found must be reduced to local mean time by applying the longitude.

As an example, suppose we wish to find the times at which the eclipse of 1918, June 8, begins and ends at Denver, Colo., latitude $+39^{\circ} 41'$, longitude $+104^{\circ} 57'$.

For the beginning we compare the distance of the place from the curve of 10^h with the distance between the curves of 9^h and 10^h and find it to correspond to about 10 minutes, thus giving for the approximate time of beginning $10^h 10^m$; for the end we compare the distance of the place from the curve of 12^h with the distance between the curves of 11^h and 12^h and find it to correspond to

about 30 minutes, thus giving for the approximate time of ending $12^h 30^m$; and both of these results are probably correct to within 3 or 4 minutes.

Changing to local mean time, we shall have—

	<i>Beginning.</i>			<i>Ending.</i>		
	d	h	m	d	h	m
Greenwich mean time	June 8	10	10	8	12	30
Longitude west		7	0		7	0
Local mean time	June 8	3	10	8	5	30

In the case of total and annular eclipses, a fair estimate of the magnitude of the eclipse at any place may be obtained from the position thereof relative to the central line and to the limit. On the central line the eclipse is annular or total, while between the central line and the limit the maximum magnitude of the eclipse is given by the quotient of the distance of the place from the limit divided by the distance of the central line from the limit, the measurements being made upon a line drawn through the place perpendicularly to the central line.

More Accurate Computations.—A more accurate determination of the phases, as visible at any point of the Earth's surface, may be obtained from the Besselian elements which are given for every 10 minutes of Greenwich mean time. Their geometric signification is as follows:—

Let us imagine a plane passing through the center of the Earth, perpendicular to the right line joining the centers of the Sun and Moon. This latter line is the axis of the Moon's shadow, and the plane is called the *fundamental plane* or plane of xy . We take the intersection of this plane with that of the Earth's equator as the axis of x , and the center of the Earth as the origin of coordinates. The axis of y is perpendicular to that of x , and directed toward the north; x and y are then the coordinates of the point in which the axis of the shadow intersects the fundamental plane, and they are here expressed in terms of the Earth's equatorial radius as unity. The angle d , of which the sine and cosine are both given, is the declination of that point of the celestial sphere toward which the axis of the shadow is directed; or, in other words, it is the declination of the center of the Sun as seen from the center of the Moon. The angle μ is the Greenwich hour-angle of this same point of the celestial sphere.

The quantities l_1 and l_2 are the radii of the shadow cones upon the fundamental plane, l_1 corresponding to the penumbra, and l_2 to the umbra. The notation is that of CHAUVENET'S *Spherical and Practical Astronomy*, in which μ is regarded as positive for an annular and negative for a total eclipse.

The angles f_1 and f_2 , the tangents of which are given, are the angles which the elements of the respective shadow cones make with the axis of the shadow; or, they are the semiangles of the two cones.

In order to facilitate interpolation to any required moment, the logarithms of x' , y' , and μ' , which are the changes of x , y , and μ , in one minute of time, are given at the bottom of the table.

The method of computing an eclipse from its Besselian elements is based on the fact that the distance of the observer from the axis of the shadow cones is equal to the radius of the penumbra at the point of observation for the beginning and ending of the eclipse, and is equal to the radius of the umbra at the

point of observation for the beginning and ending of totality or of the annular phase. To find this distance and radius in each case we proceed as follows:

- (1) The coordinates of the observer, ξ , η , and ζ , together with their variations in one minute, are computed for some assumed moment of Greenwich mean time, as near as practicable to the true time of the required phase.
- (2) The coordinates x and y of the axis of the shadow, together with their variations in one minute, are taken for the same moment from the tables of elements.
- (3) From (1) and (2) the position and motion of the observer relative to the axis of the shadow are found.
- (4) The radius of the penumbra or umbra at a distance from the fundamental plane equal to that of the observer is also computed.
- (5) Then, assuming the motions to be uniform, we determine the time required for the observer to be brought to a distance from the axis of the shadow equal to this radius.

The formulæ and directions for the several steps in the computation are as follows:—

(1) Find $\rho \cos \varphi'$ and $\rho \sin \varphi'$, which are the geocentric coordinates of the station referred to the Earth's equator, ρ being the distance from the center of the Earth and φ' the geocentric latitude. These coordinates may be computed from the following table based on the compression of the Earth adopted at the Paris Conference of 1911, 1/297, by the formulæ—

$$\rho \cos \varphi' = F \cos \varphi$$
$$\rho \sin \varphi' = \frac{\sin \varphi}{G}$$

φ being, as usual, the geographic latitude.

Table for Computing the Geocentric Coordinates of a Place.

φ	Log F .	Log G .
0°	0.00000	0.00293
5	0.00001 1	0.00292 1
10	0.00004 3	0.00289 3
15	0.00010 6	0.00283 6
20	0.00017 7	0.00276 7
25	0.00026 9	0.00267 9
30	0.00037 11	0.00256 11
35	0.00048 11	0.00245 11
40	0.00060 12	0.00232 13
45	0.00073 13	0.00220 12
50	0.00086 13	0.00207 13
55	0.00098 12	0.00207 12
60	0.00110 12	0.00195 12
65	0.00120 10	0.00183 10
70	0.00129 9	0.00173 9
75	0.00129 8	0.00164 8
80	0.00137 5	0.00156 5
85	0.00142 3	0.00151 3
90	0.00145 1	0.00148 2
	0.00146	0.00146

For the assumed Greenwich mean time of computation, take from the table of elements the values of $\sin d$, $\cos d$, and μ . Then, with λ for the longitude west from Greenwich, the coordinates of the observer will be—

$$\begin{aligned}\xi &= \rho \cos \varphi' \sin (\mu - \lambda) \\ \eta &= \rho \sin \varphi' \cos d - \rho \cos \varphi' \sin d \cos (\mu - \lambda) = \eta_1 - \eta_2 \\ \zeta &= \rho \sin \varphi' \sin d + \rho \cos \varphi' \cos d \cos (\mu - \lambda) = \zeta_1 + \zeta_2\end{aligned}$$

and their variations in one minute of mean time will be—

$$\begin{aligned}\xi' &= [7.63992] \rho \cos \varphi' \cos (\mu - \lambda) \\ \eta' &= [7.63992] \rho \cos \varphi' \sin d \sin (\mu - \lambda) - [7.63992] \xi \sin d \\ \zeta' &\text{ is not needed.}\end{aligned}$$

(2) For the same assumed moment of Greenwich mean time, take from the tables of elements the coordinates x and y of the axis of the shadow, together with their variations for one minute, which are equal to one-tenth of the differences of two consecutive numbers. These variations are represented by x' and y' , and their logarithms are given beneath the tables of x and y .

(3) The distance m and position-angle M of the axis of the shadow relative to the observer, and the relative motions, n and N , are computed by the formulæ—

$$\begin{aligned}m \sin M &= x - \xi \\ m \cos M &= y - \eta \\ n \sin N &= x' - \xi' \\ n \cos N &= y' - \eta'\end{aligned}$$

(4) Both for the umbra and for the penumbra, the radius L at the distance ζ from the fundamental plane is computed by the formulæ—

$$L = l - \zeta \tan f$$

l and f being taken from the table of elements, and ζ computed in (1).

(5) If the time chosen for computation is exactly that of the beginning or ending of the eclipse, we shall have—

$$m = L$$

But, as this condition will rarely be fulfilled on a first trial, a correction τ to the assumed time is computed thus: Find the angle ψ from the equation—

$$\sin \psi = \frac{m \sin (M - N)}{L}$$

There will be two values for this angle; the one for which $\cos \psi$ is negative must be taken for the beginning of the eclipse, for the beginning of the annular phase, or for the ending of the total phase, but the one for which $\cos \psi$ is positive must be taken for the ending of the eclipse, for the ending of the annular phase, or for the beginning of the total phase. The correction τ to the assumed time will then be found, in minutes, from—

$$\tau = -\frac{m \cos (M - N)}{n} + \frac{L \cos \psi}{n}$$

However, only in case the value of τ does not exceed a few minutes can the time thus corrected be considered even fairly accurate. Therefore it is best to commence the computation by assuming times near the phenomena wanted. The times for the beginning and the ending of an eclipse may be

derived from the chart with sufficient exactness as previously explained; the time for the total or for the annular phase may then be assumed as midway between the times assumed for the beginning and the ending of the eclipse; or, in case of a partial eclipse, this time midway may be assumed as that of the maximum eclipse.

The more accurate times resulting from the computation as outlined above and as illustrated in the example below may now be taken in place of those originally assumed, and the whole computation may be repeated, thus leading to a value of τ , in each case, which should be very small, and which should give a very accurate time of the phenomenon. Such a repetition of the computation will be advisable, moreover, for the reason that it will enable one to locate and eliminate any accidental numerical errors that may have occurred in the first computation.

As a result of this last approximation the computed times of contact will be theoretically exact within less than a second, but the uncertainties of the solar and lunar tables are such that an unavoidable error of several seconds may exist in the prediction.

Position-angle of Point of Contact.—The position-angle P , of the point of contact, reckoned from the north point of the Sun's limb toward the east, is found by the formula—

$$P = N + \phi$$

where the results of the last approximation are used.

The position-angle V , of the point of contact, reckoned from the vertex of the Sun's limb toward the east, is found by the formula—

$$V = P - C$$

where C is obtained from

$$\tan C = \frac{\xi}{\eta}$$

and again the results of the last approximation are used.

Time of Maximum Eclipse.—For a partial eclipse, or for a central eclipse at a point at which the eclipse is only partial indicated by $\sin \phi$ greater than unity for the umbra, the correction to the assumed time to obtain the time of maximum eclipse is given by the formula—

$$\tau = -\frac{m \cos (M - N)}{n}$$

Magnitude of the Maximum Eclipse.—This is given by the formula—

$$D^* = \frac{L - \Delta}{2L - 0.5446}$$

where $\Delta = \pm m \sin (M - N)$, always taken positive, and L is the radius of the penumbra. D is, in all cases, the ratio to the Sun's diameter of the straight line passing through the centers of the two disks and having for its extremities the Sun's limb that is nearest to the Moon's center and the Moon's limb that is nearest to the Sun's center. In a partial eclipse D is the fraction of the Sun's diameter covered by the Moon.

*Since, in obtaining this formula, the angles of the two shadow cones are considered the same, the value obtained therefrom should be increased by $\frac{1}{16}$ th of itself.

Computation of the Solar Eclipse of 1918, June 8, for Denver, Colo.

The position of Denver is—

Latitude, $\phi = + 39\ 40\ 36$
Longitude, $\lambda = +104\ 56\ 56$

its geocentric coordinates are—

$\rho \sin \phi' = 9.80280$
 $\rho \cos \phi' = 9.88689$

From the eclipse chart we find the approximate times of the phases to be—

Beginning	June	d	h	m	} Greenwich Mean Time.
		8	10	10	
Middle		8	11	20	
Ending		8	12	30	

June 8	Beginning. 10 ^h 10 ^m	Middle. 11 ^h 20 ^m	Ending. 12 ^h 30 ^m		Beginning.	Middle.	Ending.
	• ' "	• ' "	• ' "		• ' "	• ' "	• ' "
	152 48 30	170 18 24	187 48 24	$\log m \sin M$	9.73830 n	8.43807 n	9.74607
	104 56 56	104 56 56	104 56 56	$\log \sin \text{ or } \cos M$	9.99527 n	9.99719 n	9.99477
	47 51 34	65 21 28	82 51 28	$\log m \cos M$	8.90956	7.49554	8.93962 n
				$\log \tan M$	0.82874 n	0.94253 n	0.80645 n
$\cos \phi'$	9.88689	9.88689	9.88689	$\log n \sin N$	7.84609	7.89603	7.94699
$(\mu - \lambda)$	9.87011	9.95853	9.99662	$\log \sin \text{ or } \cos N$	9.99567	9.99484	9.99510
	9.75700	9.84542	9.88351	$\log n \cos N$	6.99782 n	7.08672 n	7.12613 n
d	9.96454	9.96453	9.96451	$\log \tan N$	0.84827 n	0.80931 n	0.82086 n
$\sin \phi'$	9.80280	9.80280	9.80280	M	278 26 16	276 30 43	98 52 31
d	9.58899	9.58907	9.58915	N	98 4 18	98 49 4	98 35 24
	9.76734	9.76733	9.76731	$M - N$	180 21 58	177 41 39	0 17 7
	9.39179	9.39187	9.39195	$\log m$	9.74303	8.44088	9.75130
d	9.58899	9.58907	9.58915	$\log n$	7.85042	7.90119	7.95189
$\cos \phi'$	9.88689	9.88689	9.88689	$\log \zeta$	9.85917	9.73454	9.52491
$(\mu - \lambda)$	9.82669	9.62008	9.09459	$\log \tan f$	7.66328	7.66111	7.66328
d	9.96454	9.96453	9.96451	$\log \zeta \tan f$	7.52245	7.39565	7.18819
	9.30257	9.09604	8.57063	l	+0.54220	-0.00358	+0.54240
	9.67812	9.47150	8.94599	$\zeta \tan f$	+0.00333	+0.00249	+0.00154
	+0.58525	+0.58524	+0.58521	L	+0.53887	-0.00607	+0.54086
	-0.20071	-0.12475	-0.03721	$\log m$	9.74303	8.44088	9.75130
	+0.24648	+0.24653	+0.24658	$\log \sin (M - N)$	7.80549 n	8.60459	7.69714
	+0.47657	+0.29614	+0.08831	$\text{colog } L$	0.26851	2.21681 n	0.26691
	+0.72305	+0.54267	+0.33489	$\log \sin \phi$	7.81703 n	9.26228 n	7.71535
$\cos \phi'$	9.88689	9.88689	9.88689	ϕ	180 22 34 { -10 32 26 } + 0 17 51		
$(\mu - \lambda)$	9.82669	9.62008	9.09459				
nst.	7.63992	7.63992	7.63992	$\log m/n$	1.89261	0.53969	1.79941
	9.75700	9.84542	9.88351	$\log \cos (M - N)$	9.99999 n	9.99965 n	9.99999
d	9.58899	9.58907	9.58915	$\log (1)$	1.89260 n	0.53934 n	1.79940
	7.35350	7.14689	6.62140	$\log L$	9.73149	7.78319 n	9.73309
	6.98591	7.07441	7.11258	$\log \cos \phi$	9.99999 n (\pm)	9.99261	9.99999
	+0.02408	+0.67310	+1.32200	$\text{colog } n$	2.14958	2.09881	2.04811
	+0.57148	+0.70052	+0.76473	$\log (2)$	1.88106 n (\mp)	9.87461	1.78119
	-0.54740	-0.02742	+0.55727	-(1)	+78.090	+3.462	-63.009
	+0.46574	+0.46362	+0.46098	+(2)	-76.043	\mp 0.749	+60.421
	+0.38454	+0.46049	+0.54800				
	+0.08120	+0.00313	-0.08702	τ	+ 2.047 { +2.713 } - 2.588		
	+0.009273	+0.009273	+0.009269				
	+0.002257	+0.001402	+0.000418				
	+0.007016	+0.007871	+0.008851	T	d h m 8 10 10	d h m 8 11 20	d h m 8 12 30
	-0.000027	-0.000034	-0.000041				
	+0.000968	+0.001187	+0.001296	$T + \tau$	d h m 8 10 12.047	d h m 8 11 22.713	d h m 8 12 27.412
	-0.000995	-0.001221	-0.001337				

Taking the four times just found, a new computation is made in each case. The times resulting from the new computation are—

				Greenwich Mean Time.				Local Mean Time.			
				d	h	m	s	h	m	s	
Beginning of the eclipse	.	.	.	June	8	10	12 2.7	3	12	15.0	
Beginning of total eclipse	.	.	.	.	.	11	22 42.7	4	22	55.0	
Ending of total eclipse,	.	.	.	.	.	11	24 11.4	4	24	23.7	
Ending of the eclipse,	.	.	.	.	.	12	27 24.2	5	27	36.5	

The values from the last approximation of the quantities needed in computing the position angles, and the computation of these position angles, are—

	1st Contact.	2d Contact.	3d Contact.	4th Contact.
log ξ	9.76048	9.84774	9.84899	9.88286
log η	9.58718	9.66626	9.66792	9.73612
log tan C	0.17330	0.18148	0.18107	0.14674
N	98.11	98.82	98.83	98.61
ϕ	180.34	-10.32	190.54	0.27
P	278.45	88.20	289.37	98.88
C	56.14	56.64	56.61	54.50
V	222.3	31.6	232.8	44.4

The magnitude of greatest eclipse is obtained as follows:—

T	11 ^h 20 ^m	l	+0.5423	$L-\Delta$	+0.5387
log ξ	9.7345	$\xi \tan f$	+0.0025	$2L-0.5446$	+0.5350
log tan f	7.6633	L	+0.5398	D	1.007
log $\xi \tan f$	7.3978	Δ	+0.0011	$1/400 D$	.003
				Magnitude	1.01

Pages 566–570 contain the adopted mean places and annual proper motions of such stars, as bright as magnitude 6.5, as will be occulted during the year by the Moon.

Pages 571–608 contain the elements for the prediction of the times of occultations of stars and planets by the Moon during the current year. The system of coordinates employed is similar to that already described for eclipses, the fundamental plane passing through the center of the Earth, and being taken perpendicular to the line joining the star and the center of the Moon, but the cone circumscribing the Moon and star is regarded as a cylinder which intercepts the fundamental plane in a circle having the same linear diameter as the Moon.

In the columns referring to the star, those headed *Red'ns from 1918.0* give the quantities necessary to reduce the mean place of the star at the beginning of 1918 to its apparent place at the time of occultation. These reductions are sufficiently accurate to be definitive.

Under the general head, *At Conjunction in R. A.*, are five columns giving certain quantities for the moment of geocentric conjunction of the Moon and star in right ascension, as follows:

The *Greenwich Mean Time* is the moment, T , at which the two bodies are in geocentric conjunction in right ascension. At that moment the coordinate x of the axis of the cylinder on the fundamental plane has the value zero. The column *Hour Angle, H*, gives the common geocentric hour-angle of the Moon and star at the same moment, expressed in sidereal time and counted

from the meridian of Greenwich—positive toward the west and negative toward the east. Column Y gives the coordinate y of the axis of the cylinder upon the fundamental plane at the same moment. Columns x' and y' give the variations of x and y in one hour of mean time. The linear unit in these columns is the Earth's equatorial radius. The limiting parallels, north and south, show the extreme limits of latitude within which the occultation will be visible.

By the aid of these elements, the time of immersion and emersion of a star relative to the limb of the Moon may be computed for any part of the Earth by a method nearly the same as that already explained for computing eclipses, but somewhat more simple.

Prediction of Occultations for a given Place.—When it is desired to predict the circumstances of one or more occultations at any place, the first step will be to select them from the general list given in the Ephemeris. The conditions of visibility are:—

1. The limiting parallels in the last columns must include the latitude of the place.

2. The quantity $H-\lambda$, taken without regard to sign, must be less than the semidiurnal arc of the star by at least one hour. On very rare occasions an emersion might be seen in the east, or an immersion in the west, when this difference is a few minutes less than an hour.

3. The Sun must not be much more than an hour above the horizon at the local mean time $T-\lambda$, unless the star is bright enough to be seen in the daytime.

When many occultations are to be selected, the most convenient course will be to write the value of $-\lambda$ on the bottom of a slip of paper, and in passing through the list of occultations to pause over each one for which condition (1) is fulfilled, and examine by means of the slip whether conditions (2) and (3) are also fulfilled. If either fails, the computer passes on. Sometimes it will be difficult to determine whether $H-\lambda$ or $T-\lambda$ falls within the limits; and in such cases the computer may mark the occultation for trial and leave the decision for the subsequent operations. The whole list can be gone over in less than a day, and it will probably be found that about one-tenth of the occultations are marked for trial.

The next step will be to compute the local times of immersion and emersion from the elements, and to that end let—

T —the instant of geocentric conjunction of Moon and star in right ascension, expressed in Greenwich mean time;

H —the Greenwich west hour-angle of the two bodies at that moment;

λ —the longitude west of Greenwich;

$h_0 = H - \lambda$ —the local hour-angle of the star at the instant T ;

δ —the star's declination.

The procedure for each occultation will then be as follows:—

(1) The geocentric coordinates of the place, $\rho \sin \varphi'$ and $\rho \cos \varphi'$, are to be computed by the formulæ and table given in connection with eclipses on page 726.

The next step will be to find the approximate instant of apparent conjunction of the Moon and star as seen from the place, and that may be deduced from the time of geocentric conjunction by the application of an approximate

correction taken from DOWNES's table, printed in the volumes of the American Ephemeris for 1882 to 1899. This correction must be reckoned in mean solar hours, and will be designated by the symbol t . It will have the same sign as h_0 .

When DOWNES's table is not available, the correction may be computed from the formulæ—

$$\begin{aligned}\xi_0 &= \rho \cos \varphi' \sin h_0 \\ \xi' &= [9.4192] \rho \cos \varphi' \cos \frac{4}{3} h_0 \\ t &= \frac{\xi_0}{x' - \xi'}\end{aligned}$$

By applying t to the Greenwich mean time of geocentric conjunction, as given with the elements, we shall have the Greenwich mean time of local conjunction within a few minutes.

(2) Compute for the instant $T+t$ the following quantities, in which t_0 is the sidereal equivalent of the mean time interval t :

$$\begin{aligned}\xi &= \rho \cos \varphi' \sin (h_0 + t_0) \\ \eta &= \rho \sin \varphi' \cos \delta - \rho \cos \varphi' \sin \delta \cos (h_0 + t_0) = \eta_1 - \eta_2 \\ \xi' &= [9.4192] \rho \cos \varphi' \cos (h_0 + t_0) \\ \eta' &= [9.4192] \rho \cos \varphi' \sin \delta \sin (h_0 + t_0) = [9.4192] \xi \sin \delta \\ x &= x't \\ y &= Y + y't\end{aligned}$$

Compute also m , M , n , N , and ψ from the equations.

$$\begin{aligned}m \sin M &= x - \xi \\ m \cos M &= y - \eta \\ n \sin N &= x' - \xi' \\ n \cos N &= y' - \eta' \\ \sin \psi &= [0.5646] m \sin (M - N)\end{aligned}$$

ψ being taken between the limits $\pm 90^\circ$. Finally compute,

$$\begin{aligned}\tau &= -\frac{[1.7782]m}{n} \cos (M - N) \mp \frac{[1.2135]}{n} \cos \psi \\ \delta\tau &= \frac{[6.7591]\tau^2}{n \cos \psi} [\eta_2 \cos (N \mp \psi) - \xi \sin (N \mp \psi)]\end{aligned}$$

where the double signs are to be taken negative for an immersion and positive for an emersion. Both τ and $\delta\tau$ thus have two values, which are expressed in minutes of time, and in order to distinguish them let those pertaining to immersion be designated, respectively, τ' and $\delta\tau'$, while those pertaining to emersion are designated τ'' and $\delta\tau''$. We then have for the Greenwich mean times of the phases,

$$\begin{aligned}\text{Instant of immersion} &= T + t + \tau' + \delta\tau' \\ \text{Instant of emersion} &= T + t + \tau'' + \delta\tau''\end{aligned}$$

These expressions are practically exact, as the corrections $\delta\tau$ seldom amount to so much as 1.5 minutes, and whenever an inaccuracy of that magnitude is permissible they may be omitted. As a check upon the results it will be advisable to compute ξ , η , x , and y for the times of immersion and emersion finally obtained. If these times are correct, the quantities in question will fulfill the condition,

$$\sqrt{(x - \xi)^2 + (y - \eta)^2} = 0.2725$$

If $\log m \sin (M - N) > 9.4354$, $\sin \psi$ will be numerically greater than unity, and no occultation is to be expected at the given place; but a very brief

one may occur if the excess of the computed distance over the Moon's semi-diameter happens to be within the errors of the ephemerides of the Moon and star.

The position-angle of the line from the Moon's center to the star, at the time of contact, is reckoned from the north point toward the east, and designated by the symbol P . It is computed from the formulæ—

$$\begin{aligned} P &= N - \psi + \delta P && \text{for immersion,} \\ \text{or } P &= N + \psi + \delta P \pm 180^\circ && \text{for emersion,} \end{aligned}$$

where the angles $N - \psi$ and $N + \psi$ are taken directly from the computation of $\delta\tau$, and δP is found in degrees of arc from the expression,

$$\delta P = \mp \frac{[7.3038]r^2}{\cos \psi} [\eta_2 \sin N + \xi \cos N]$$

In the latter formula the double sign is to be taken negative for an immersion and positive for an emersion.

The angle from the vertex, V , is also reckoned in the direction from the north toward the east, and is found from the formula

$$V = P - C$$

where C is computed from the expression,

$$\tan C = \frac{\xi + [8.2218]\tau\xi' - [4.9810]\tau^2\xi}{\eta + [8.2218]\tau\eta' + [4.9810]\tau^2\eta_2}$$

C being taken less or greater than 180° , according as the numerator is positive or negative.

The value of τ employed in the latter formula must be so taken as to correspond with the phase for which C is required.

In the volumes of the American Ephemeris for the years 1882 to 1901 instructions are given for constructing three special tables which greatly diminish the labor of computing occultations, but as these tables should contain from 4700 to 6300 quantities, and as they would apply only to the place for which they were computed, it will rarely be worth while to undertake the labor of forming them. Those who desire further information on the subject may consult any one of the volumes in question.

As an example of an isolated occultation, we will compute that of π Sagittarii on August 18, 1918, for Oxford, Miss., whose position is—

$$\begin{aligned} \varphi &= +34^\circ 22' 12''.6 \\ \lambda &= + 5^h 58^m 7^s.2 \end{aligned}$$

and whose geocentric coordinates are—

$$\begin{aligned} \rho \sin \varphi' &= 9.7492 \\ \rho \cos \varphi' &= 9.9171 \end{aligned}$$

From the elements on page 594 we have,

$$\begin{aligned} T &= 16^h 35.4^m \\ H &= + 7 17.3 \\ h_0 &= H - \lambda = + 1 19.2 \end{aligned}$$

and

From the formulæ on page 732, we find the correction, t , to the Greenwich mean time of geocentric conjunction, T , to be about $+0^h 43^m.9$; therefore the Greenwich mean time of apparent conjunction is—

$T+t$ —August 18^d 17^h 19^m.3

π Sagittarii.	Apparent Declination.	G. M. T. of \odot	Hour Angle.	Y	x'	y'
	$-21\ 9.2$	d h m Aug. 18 16 35.4	h m +7 17.3	+0.7302	0.5768	+0.1120

h_o	$+1\ 19.2$	$y't$	+0.0820	$\log m$	8.5134
t_o	+0 44.0	Y	+0.7302	$\log n$	9.6223
h_o+t_o	+2 3.2	x	+0.4221	$\log \text{const.}$	0.5646
$\log (\rho \cos \varphi')$	9.9171	ξ	+0.4231	$\log m$	8.5134
$\log \sin (h_o+t_o)$	9.7093	$x-\xi$	-0.0010	$\log \sin (M-N)$	9.9743 n
$\log \xi$	9.6264	y	+0.8122	$\log \sin \psi$	9.0523 n
$\log (\rho \sin \varphi')$	9.7492	η	+0.7796	ψ	- 6° 29'
$\log \cos \delta$	9.9697	$y-\eta$	+0.0326	$\log \text{const.}$	1.7782
$\log \eta_1$	9.7189	x'	+0.5768	$\log m/n$	8.8911
$\log (\rho \cos \varphi')$	9.9171	ξ'	+0.1863	$\log \cos (M-N)$	9.5242
$\log \sin \delta$	9.5573 n	$x'-\xi'$	+0.3905	$\log (1)$	0.1935
$\log \cos (h_o+t_o)$	9.9340	y'	+0.1120	$\log \text{const.}$	1.2135
$\log \eta_2$	9.4084 n	η'	-0.0401	$\text{colog } n$	0.3777
η_1	+0.5235	$y'-\eta'$	+0.1521	$\log \cos \psi$	9.9972
$-\eta_2$	+0.2561	$\log m \sin M$	7.0000 n	$\log (2)$	1.5884
$\log (\rho \cos \varphi')$	9.9171	$\log \cos M$	9.9998	$-(1)$	m - 1.56
$\log \cos (h_o+t_o)$	9.9340	$\log m \cos M$	8.5132	$\mp(2)$	∓ 38.76
$\log \text{const.}$	9.4192	$\log \tan M$	8.4868 n	$r \text{ for immersion}$	-40.82
$\log \xi$	9.6264	$\log n \sin N$	9.5916	$r \text{ for emersion}$	+37.20
$\log \sin d$	9.5573 n	$\log \sin N$	9.9693		
$\log \xi'$	9.2703	$\log n \cos N$	9.1821		
$\log \eta'$	8.6029 n	$\log \tan N$	0.4095		
$\log x'$	9.7610	M	358 15		
$\log t$	9.8644	N	68 43		
$\log y'$	9.0492	$M-N$	289 32		
$\log x$	9.6254				
$\log y't$	8.9136				

The computation of δr for the two contacts is as follows:

	Immersion.	Emersion.		Immersion.	Emersion.
$N\mp\psi$	75° 12'	62° 14'	$\log [(1)-(2)]$	9.6761 n	9.6935 n
$\log \cos (N\mp\psi)$	9.4073	9.6683	$\log \text{const.}$	6.7591	6.7591
$\log \eta_2$	9.4084 n	9.4084 n	$\log r^2$	3.2110	3.1411
$\log (1)$	8.8157 n	9.0767 n	$\text{colog } (n \cos \psi)$	0.3805	0.3805
$\log \sin (N\mp\psi)$	9.9853	9.9469	$\log \delta r$	0.0267 n	9.9742 n
$\log \xi$	9.6264	9.6264	$T+t$	d h m Aug. 18 17 19.3	d h m 17 19.3
$\log (2)$	9.6117	9.5733	r	-40.32	+37.20
(1)	-0.0654	-0.1193	δr	- 1.06	- 0.94
(2)	+0.4090	+0.3744	Greenwich M. T.,	d h m Aug. 18 16 37.9	d h m 17 55.6
(1)-(2)	-0.4744	-0.4937	λ	+5 58.1	+5 58.1
			Oxford M. T.,	Aug. 18 10 39.8	11 57.5

To find δP and P :

$\log \eta_2$	9.4084 n	$\log \xi$	9.6264	(3)	-0.2386
$\log \sin N$	9.9693	$\log \cos N$	9.5598	(4)	+0.1535
$\log (3)$	9.3777 n	$\log (4)$	9.1862	(3)+(4)	-0.0851
	Immersion.	Emerision.		Immersion.	Emerision.
$\log [(3)+(4)]$	8.9299 n	8.9299 n	δP	+ 0.3	- 0.2
$\log \text{const.}$	7.3038 n	7.3038	N	+68.7	+68.7
$\log r^2$	3.2110	3.1411	$\mp \psi$	+ 6.5	- 6.5
$\text{colog } \cos \psi$	0.0028	0.0028	const.	0.0	180.0
$\log \delta P$	9.4475	9.3776 n	P	75.5	242.0

Pages 609–611 contain in detail all the data necessary for observing every culmination of the general list which is visible at Washington during the current ar.

Page 612 contains the *Ephemeris for Physical Observations of the Sun*.

Page 613 contains certain elements referring to the Moon, its equator, and its orbit.

i – the inclination of the Moon's mean equator to the Earth's true equator.

Δ – the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic of date.

Ω' – the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator.

Γ' – the longitude of the perigee of the Moon's orbit, referred to the mean equinox of date.

Ω – the longitude of the ascending node of the Moon's orbit on the ecliptic, referred to the mean equinox of date.

ζ – the Moon's mean longitude, referred to the mean equinox of date.

Pages 614–621 contain the *Ephemeris for Physical Observations of the Moon*. The selenographic longitudes are measured in the plane of the Moon's equator, the axis of reference being the radius of the Moon which passes through the mean center of the visible disk positive toward the west—i. e., toward Mare Isidum—and the latitudes are measured from the Moon's equator, positive toward the north—i. e., in the hemisphere containing Mare Serenitatis.

The optical and physical librations in longitude and latitude have been computed with elements and formulæ given on page xi, and their sums are given in the second and third columns, respectively, the physical libration being given separately in the fourth and fifth columns. The Sun's selenographic colongitude (90° – longitude) and latitude and the position-angle of the Moon's axis, C , in the sixth, seventh, and eighth columns, respectively, have been corrected for the effect of physical libration.

When the libration in longitude is positive, the mean center of the disk is displaced toward the east—that is, the region thus exposed to view is on the west limb—and when the libration in latitude is positive the mean center of the disk is displaced toward the south—that is, the region thus exposed to view is on the north limb.

The altitude of the Sun, A , at any given time above the horizon of any point on the Moon whose selenographic longitude and latitude, λ and β , are known, may be computed from the following formula, the Sun's selenographic longitude and latitude being denoted by l_\odot and b_\odot , respectively:

$$\sin A = \sin b_\odot \sin \beta + \cos b_\odot \cos \beta \cos (l_\odot - \lambda)$$

Pages 622–623 contain the data with reference to the illuminated disks of Mercury and Venus. The angle θ is the angle which the arc of the great circle from the planet to the Sun makes with the arc from the planet toward the west.

measured in the direction west, north, east, south. It is measured from 0° to 360° . We may also regard θ as expressing the angle which the line of cusps makes with the meridian, the positive direction of the meridian being toward the north, and the positive direction of the line of cusps that in which a person following this line would have the illuminated portion of the disk on his right.

Pages 624–627 contain the *Ephemeris for Physical Observations of Mars*. The quantities here given have been corrected for aberration, so that in using them they should be interpolated to the actual time of observation.

P —the position-angle of the axis of rotation measured eastward from the north point of the disk.

A_\oplus , A_\odot —the planetocentric right ascensions of the Earth and Sun, respectively, measured in the plane of the planet's equator from its vernal equinox.

D_\oplus , D_\odot —the planetocentric declinations of the Earth and Sun, respectively, referred to the planet's equator.

\odot_δ —the planetocentric longitude of the Sun measured in the plane of the planet's orbit from its vernal equinox.

k —the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

i —the angle between the Sun and the Earth as seen from the planet.

q —the angular value of the greatest defect of illumination as seen from the Earth.

Q —the position-angle of the radius of the disk which passes through the point of greatest defect of illumination—that is, of the radius perpendicular to the line joining the cusps. It is measured eastward from the north point of the disk.

The column headed *Central Meridian* contains the longitude of the meridian which bisects the disk, measured from the adopted zero meridian.

The columns headed *Mean Time of Transit of Zero Meridian* contain the Greenwich Mean Time of every transit of the zero meridian across the actual center of the disk.

Page 628 contains, for the *Satellites of Mars*, the diagram of their orbits and the times of their elongations.

Pages 629–632 contain the *Ephemeris for Physical Observations of Jupiter*.

The columns headed *Central Meridian* contain the longitudes of the meridian which bisects the disk, measured from the adopted zero meridian of System I and System II, respectively.

The column headed *Correction for Phase* contains the corrections to be applied to the longitudes of the central meridian to obtain the longitudes of the meridian bisecting the illuminated disk.

The column headed *Transit of Zero Meridian* contains the Greenwich mean time of every fifth transit of the zero meridian across the center of the illuminated disk.

The quantities in the remaining columns on pages 629–630 are the same as those defined under the *Ephemeris for the Physical Observations of Mars*.

Pages 633–659 contain, concerning the *Satellites of Jupiter*, the diagram of the orbits of Satellites I–V, the times of conjunction of Satellites I–IV, the times of elongation of Satellite V, the differences in right ascension and declination between Jupiter and Satellites VI and VII, and the phenomena of the Satellites I–IV together with their configurations.

Page 660 contains the *Magnitude of Saturn* and the *Elements of the Rings*.

a , b —the major axis and minor axis, respectively, of the outer ellipse of the outer ring.

P —the position-angle of the northern semi-minor axis of the rings, measured from the north, positive toward the east.

B —the Saturnicentric latitude of the Earth referred to the plane of the rings, positive toward the north.

$U+180^\circ$ —the Saturnicentric longitude of the Earth measured in the plane of the rings from their ascending node on the Earth's equator.

ω —the distance in the plane of the rings from their ascending node on the Earth's equator to their ascending node on the ecliptic.

B' —the Saturnicentric latitude of the Sun referred to the plane of the rings, positive toward the north.

$U'+180^\circ$ —the Saturnicentric longitude of the Sun measured in the plane of the rings from their ascending node on the ecliptic.

Pages 661–669 contain, concerning the *Satellites of Saturn*, the diagram of the orbits of the seven inner satellites, the times of elongation for the first eight satellites, the differences in right ascension and declination between Saturn and Phœbe, the ninth satellite, and tables for predicting the position-angles and distances from the center of the planet of the first eight satellites.

Page 670 contains the diagram of the orbits of the satellites of Uranus, together with the times of their elongations.

Pages 671–672 contain tables for predicting the position-angles and distances from the center of the planet of the satellites of Uranus and Neptune.

Page 673 contains the diagram of the orbit of the satellite of Neptune, together with the times of its elongations.

Pages 674–675 contain the *Phenomena*, or the configurations of the Sun, Moon, and planets, expressed in the symbols of page xviii. The predicted times of the conjunctions, quadratures, and oppositions of the planets with respect to the Sun are, respectively, the instants when the longitude of each planet differs from that of the Sun by 0° , $\pm 90^\circ$, or 180° . For the conjunction of the planets with the Moon and with each other, the predicted times are the instants when the two bodies have the same right ascension. In the case of conjunction the degrees and minutes to the right indicate the difference of declination. Thus, $\delta \text{ } \text{♂} \text{ } \text{☾} \text{ } \text{ } \text{♂} - 4^\circ 22'$ would be read “Conjunction of Mars with the Moon, Mars $4^\circ 22'$ to the South.”

These pages contain also the beginning of the seasons; the perihelia and aphelia of the planets, including the Earth; the passage of the planets through the nodes of their orbits upon the ecliptic; and the date of lunar and solar eclipses, with their aspect as seen from Washington.

Pages 676–685 contain the *Positions of Observatories*, together with a list of the authorities from which the positions are obtained. The tabular arrangement is self-explanatory.

Page 686 contains two examples in the computation of lunar distances, which are inserted because lunar distance tables are no longer published.

Pages 687–711 contain a series of tables numbered from I to VII.

Table I—*For Finding the Latitude by an Observed Altitude of Polaris.*

Table II—*For converting Sidereal into Mean Solar Time.*

Table III—*For converting Mean Solar into Sidereal Time.*

Table IV—*For Finding the Azimuth of Polaris at All Hour Angles.*

Table V—*For Finding the Azimuth of Polaris at Elongation.*

Table VI—*For Finding the Times of Upper and Lower Culmination of Polaris.*

Table VII—*For finding the Apparent Place, Time of Upper Culmination, and Time Interval between Upper Culmination and Elongation, of Polaris.*

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